

NAVAL RESEARCH LABORATORY
NAVAL CENTER
FOR
SPACE TECHNOLOGY

GLAST LAT Calorimeter Subsystem
Electromagnetic Interference Test Report
Acceptance Testing (FM106, FM107, FM108)

GLAST Doc. Number: LAT-TD-05491-01

20 December 2004



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RECORD OF CHANGES

REVISION LETTER	DATE	TITLE OR BRIEF DESCRIPTION	ENTERED BY
—	20 December 2004	Draft for Review	M. Obara

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1 GENERAL

1.1 Introduction. This document contains the details which characterizes the electromagnetic emissions characteristics of the GLAST LAT Calorimeter Subsystem. Acceptance testing was conducted in accordance with the "Electromagnetic Interference (EMI) Test Procedure" LAT-PS-03929-03 (07 Sep 2004), at the Naval Research Laboratory. Three CAL flight models were tested in sequence: FM106, FM107, and FM108. Testing began on 13 December 2004 and was completed on 14 December 2004.

1.2 Test Summary. Table 1-1 summarizes the acceptance test results obtained on the CAL.

Table 1-1. Acceptance Test Requirements and Results Summary

EMI Test Procedure: LAT-PS-03929-03		Test Sample: CAL Tower Modules
EMITP reqs.	ACCEPTANCE TESTS	TEST RESULTS
4.1	EMI Test Preliminary Set-Up (and Bonding Measurements)	Satisfactory (FM106) Satisfactory (FM107) Satisfactory (FM108)
4.2	Pre-EMI Functional Test of Flight CAL	Satisfactory (FM106) Satisfactory (FM107) Satisfactory (FM108)
4.3	CE102 Conducted Emissions, Power Leads 10kHz - 10MHz	Passed (FM106) Passed (FM107) Passed (FM108)
4.5	CS102 Conducted Susceptibility, Power Leads 10kHz - 10MHz	Passed (FM106) Passed (FM107) Passed (FM108)
4.13	Post EMI/EMC Performance Test	Satisfactory (FM106) Satisfactory (FM107) Satisfactory (FM108)

1.3 Applicable Documents. The following documents were referenced during the preparation and development of the test requirements and procedures for the CAL.

1.3.1 Military

MIL-STD-461E	Requirements for the Control of Electromagnetic Interference Characteristics of Subsystems and Equipment
MIL-STD-462	Measurement of Electromagnetic Interference Characteristics

1.3.2 NRL

LAT-PS-03929-03 SSD-TP-GL001	GLAST LAT Calorimeter Subsystem Electromagnetic Interference (EMI) Test Procedure
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2 UNIT UNDER TEST (UUT)

2.1 UUT Description. The three CAL Tower Modules (out of sixteen plus spares that comprise the CAL subsystem) that were tested consist of:

- CAL Module (Flight Article), P/N: LAT-DS-04539
 - S/N: FM106, FM107, FM108
- Tower Electronics Module (TEM-EM2 non-flight ground test unit)
- Tower Power Supply (TPS-EM2 non-flight ground test unit)

2.2 UUT Electromagnetic Compatibility Requirements. The CAL was tested to the applicable acceptance requirements as specified in the Electromagnetic Interference (EMI) Test Procedure, LAT-PS-03929-03. The applicable tests are listed in Table 1-1.

2.3 UUT Configuration. The general test configuration for the CAL is specified in the Electromagnetic Interference (EMI) Test Procedure, LAT-PS-03929-03. The Support Test Equipment (STE) simulated in-flight power conditions and provided appropriate communications links and loads for the CAL.

2.3.1 Modes of Operation. The CAL was configured in its most active mode for emissions testing and also for susceptibility testing. The CAL operation modes (Register Exerciser Test and the Charge Injection Calibration) are defined in LAT-MD-1502.

2.3.2 Connector and Cable Configuration. Test cables and connectors used throughout all the EMC tests were similar in construction to the actual flight harness. The test harness was made up of shielded twisted pairs with a gross overall shield. The shields on both ends were terminated to the connector back shells.

2.3.3 Power Requirements. The general test setup was in accordance with Figure 3-1 and Figure 3-2 of the Electromagnetic Interference (EMI) Test Procedure, LAT-PS-03929-03. The CAL obtained all its DC power from the STE. A 10 uF Line Stabilization Capacitors (LSC) was used to connect the primary +28v Line to the Test Bench Ground Plane (TBGP) and a second LSC used to connect the primary RETURN Line to the TBGP.

3 EMI TEST FACILITIES

3.1 Test Data. The data collected during the EMI test was recorded on a variety of media, including spectrum analyzer plots and data sheets with hand entries. EMI test data are provided in Appendix A through Appendix F. A log book was also maintained and photographs taken which documented the chronological activity of this test effort. A copy of the logbook pages are provided in Appendix G. Photographs of the test set-up and configurations are provided in Appendix H.

3.2 Test Enclosure. The limited set of Acceptance Tests did not require using an EMI shielded anechoic chamber. Testing was conducted in the GLAST clean room facility in Building A59.

3.3 Ground Plane. The three UUT were installed and tested in their shipping containers (IAW Figure 3-2 of the EMI Test Procedure, LAT-PS-03929-03). The aluminum base plate of the shipping container simulated the ground

plane Grid Simulator for the CAL unit. An additional copper sheet was bonded to the aluminum base plate to extend the ground plane for attaching the 10 uF Line Stabilization Capacitors (LSC). The DC resistance between the UUT and the aluminum base plate was measured to be less than 2.5 milli-ohms.

3.4 Test Equipment. Only calibrated equipment, antennas, and sensors were used to obtain quantitative measurements during the EMI testing.

4 TEST PROCEDURES. All testing was performed in accordance with the acceptance requirements of the "GLAST LAT Calorimeter Subsystem Electromagnetic Interference (EMI) Test Procedure", LAT-PS-03929-03.

4.1 Test Procedure Issues. Any deviations from the original document were red-lined into the "as-run" EMI Test Procedure. The Test Procedure was subsequently updated and re-released with all the changes incorporated.

5 TEST RESULTS. Setup of the CAL, the EMI test equipment, and Support Test Equipment (STE) began on 13 December 2004. The three CAL units were tested in succession and all testing was completed on 14 December 2004. All testing was done in the GLAST clean room facility at the Naval Research Laboratory, Washington, DC. Testing was conducted in accordance with the EMI Test Procedure, except as noted in section 4.1 of this document, and the results of the individual EMC tests are explained and commented upon in the following sections.

5.1 EMI Test Preliminary Set-Up. The test setup of all the CAL and Calorimeter Test Structures (CTS) were in accordance with Figure 3-1 and Figure 3-2 of the EMI Test Procedure. The bonding resistance between the CAL and the ground plane shall be less than 2.5 milliohms.

The bond between the CAL and base plate ground plane were measured as follows:

FM106 - 0.71 milliohms
 FM107 - 0.71 milliohms
 FM108 - 0.93 milliohms

5.2 Pre-EMI Functional Test of Flight CAL. The Pre-EMI Comprehensive Performance and Functional Tests (as specified in LAT-PS-1370) were performed on all the CAL and EM2 TEM/TPS. All test results were satisfactory. It also provided a performance baseline and established nominal system telemetry readings for the pass/fail criteria during susceptibility testing.

5.3 Conducted Emissions, Power Leads, 10kHz - 10MHz (CE102). The narrowband conducted emissions shall be less than the limits specified in the EMI Test Procedure, Section 4.3 for all modes of operation over the frequency range of 10 kHz - 10 MHz.

The EMI test equipment was verified for proper operation. Prior to testing the first UUT, calibration signals were injected on the terminals of a dummy load and measurements were taken. All measured calibration signal levels were SATISFACTORY (all within +/-3 dB of the expected values). The calibration plots are provided in Appendix C.

The emissions on the +28 Vdc line and the RETURN line for all three CAL units were all below the CE102 limits. The data plots are provided in: Appendix A (FM106), Appendix B (FM107), and Appendix C (FM108).

5.4 Conducted Susceptibility, Power Leads, 10kHz – 10MHz (CS102). The UUT shall not be adversely degraded when subjected to a high frequency (10 kHz – 10 MHz) sinusoidal ripple current on the primary input power line. The amplitude of the ripple current is specified in the EMI Test Procedure, Figure 4-5.

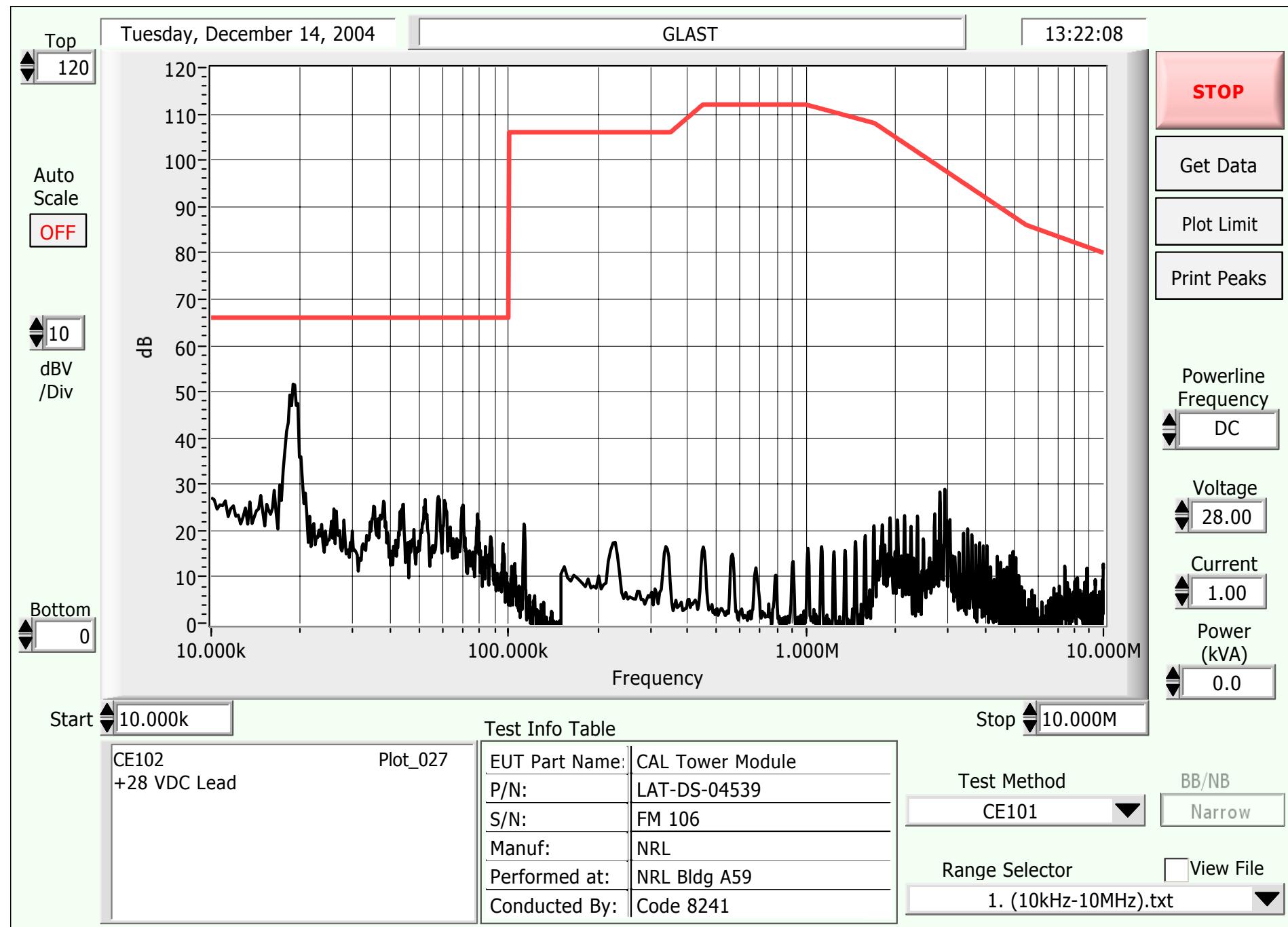
The EMI test equipment was calibrated to produce the required injected amplitudes over the entire frequency range. A coupling transformer driving a 0.5 ohm load was used from 10 kHz to 150 kHz, and a coupling capacitor driving a 50 ohm load was used from 150 kHz to 10 MHz. The calibration plots are provided in Appendix F.

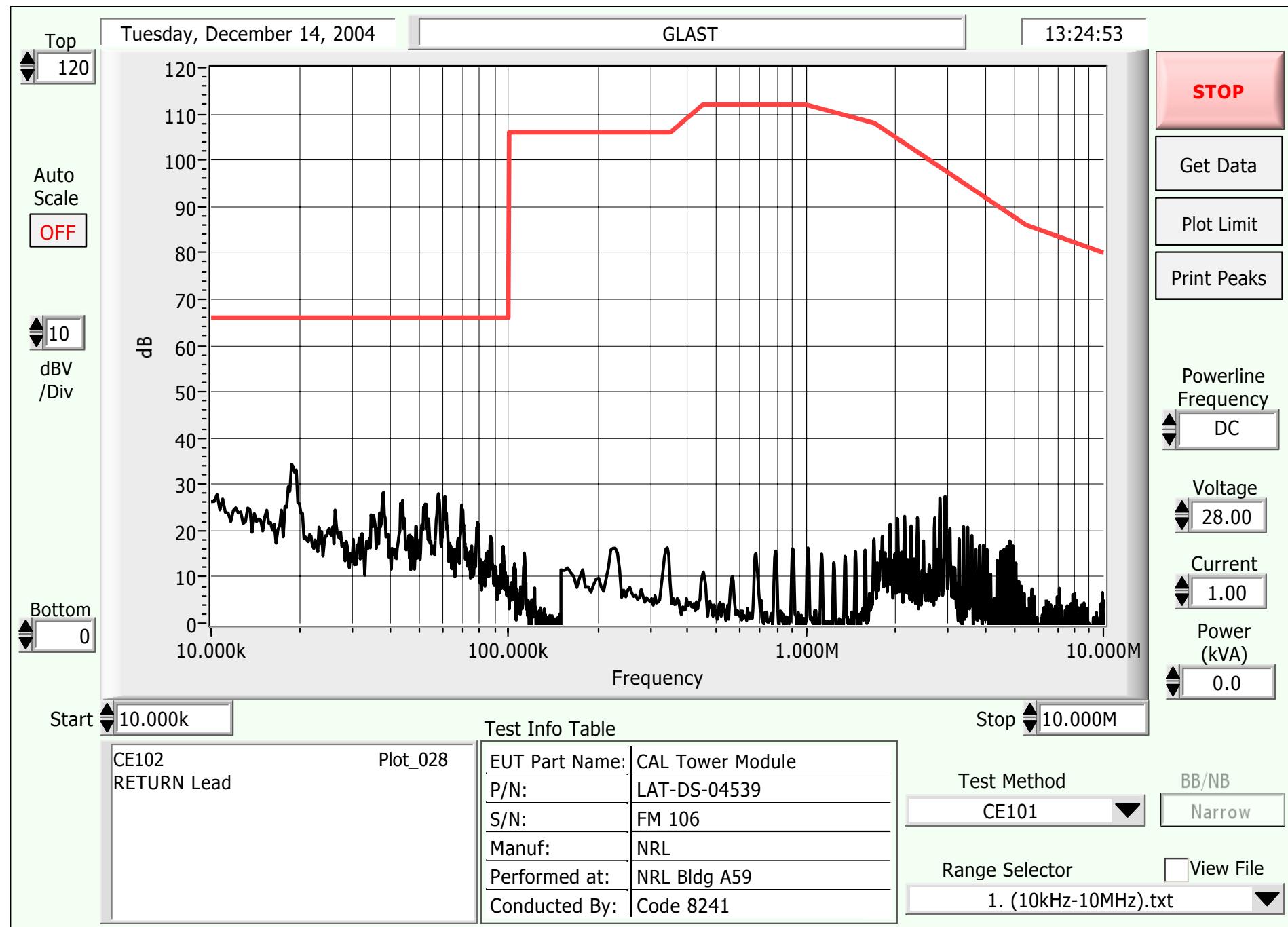
All three CAL units performed without any degradation. The data plots of the CS102 injected current are provided in: Appendix D (FM106), Appendix E (FM107), and Appendix F (FM108).

5.5 Post EMI/EMC Performance Test. The post-EMI Comprehensive Performance and Functional Tests (as specified in LAT-PS-1370) were performed on all the CAL and EM2 TEM/TPS. All test results were satisfactory.

Appendix A – CE102 Test Data (FM106)

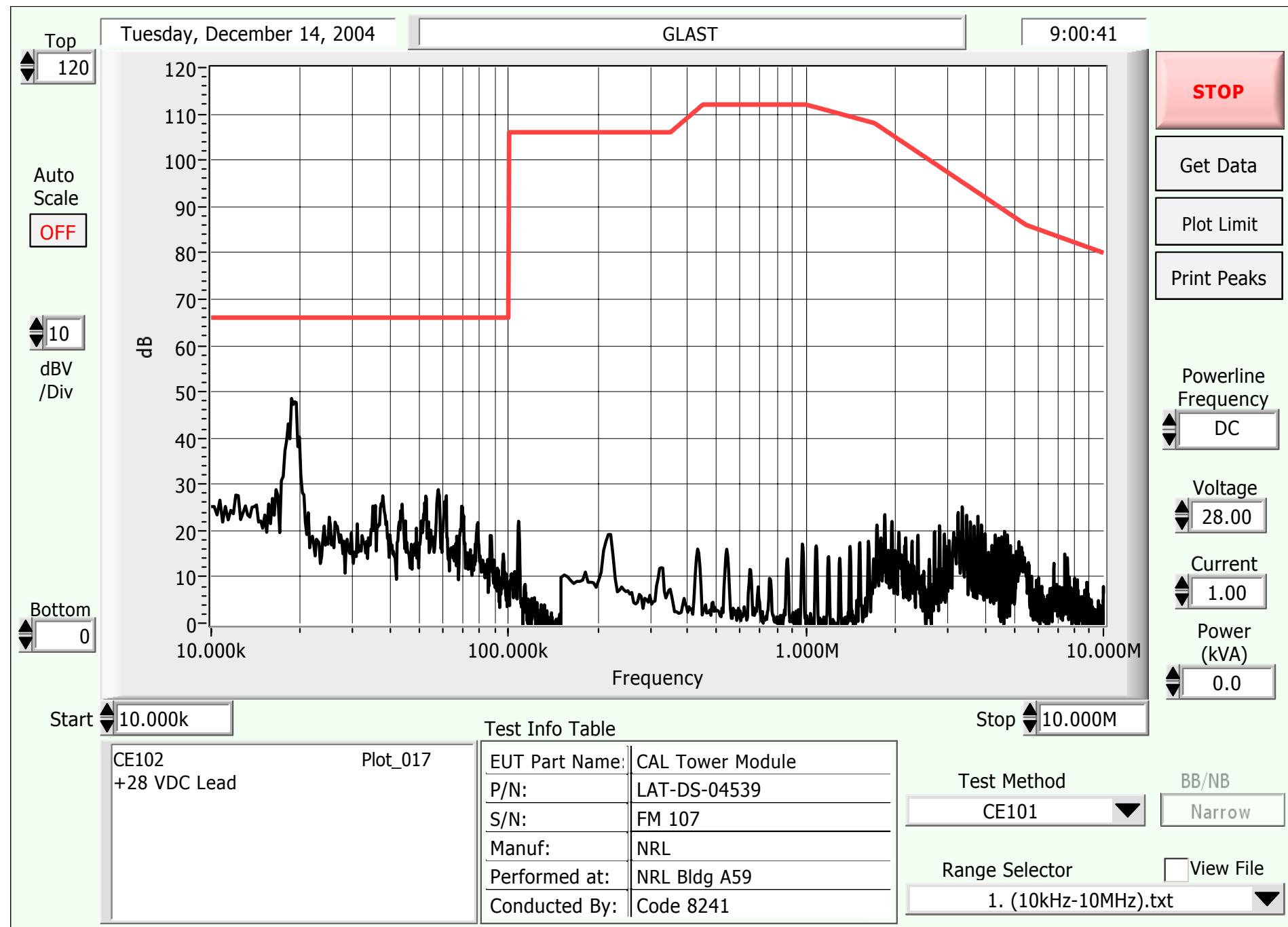
(Plot_027 to Plot_028)

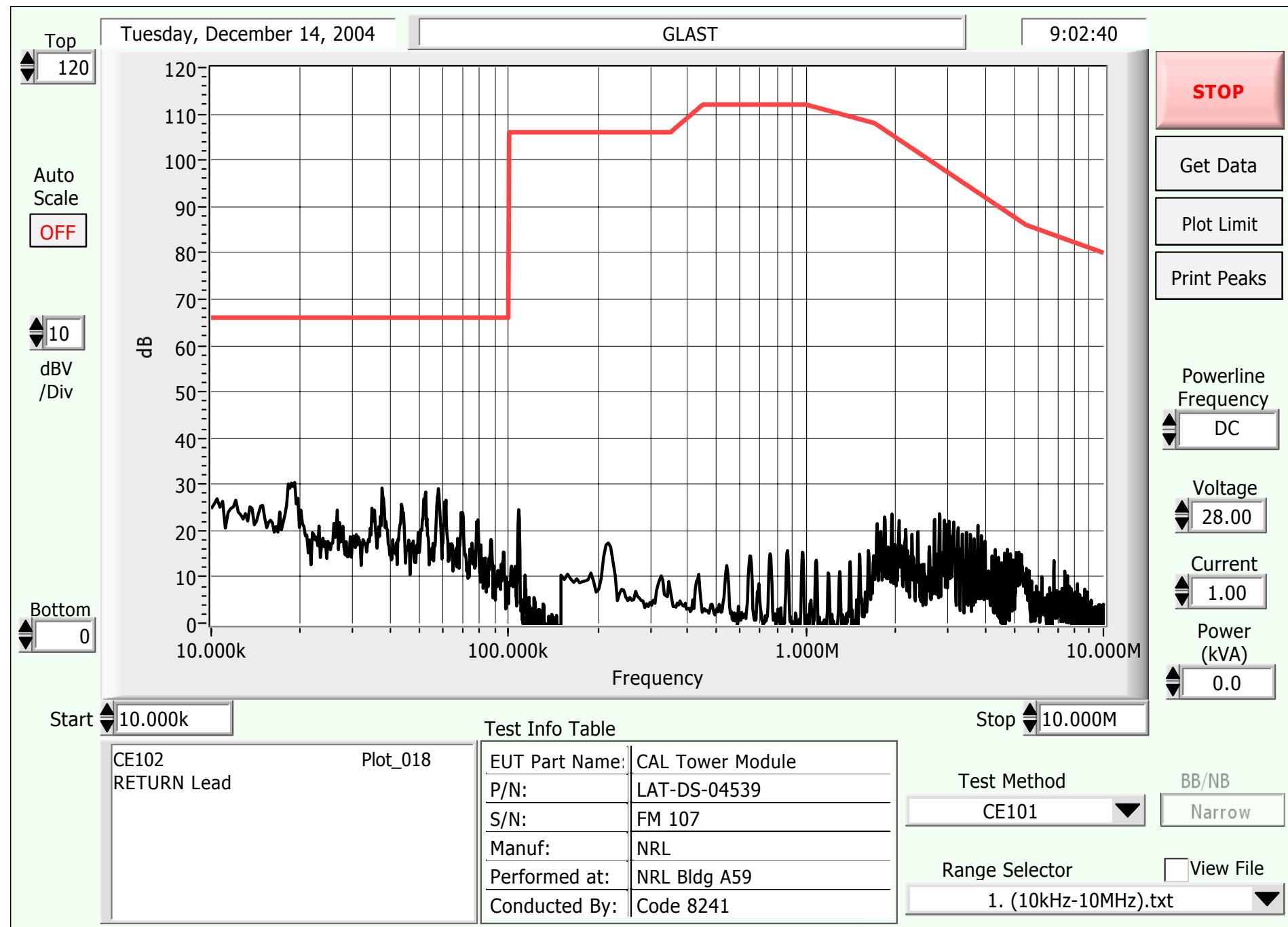




Appendix B – CE102 Test Data (FM107)

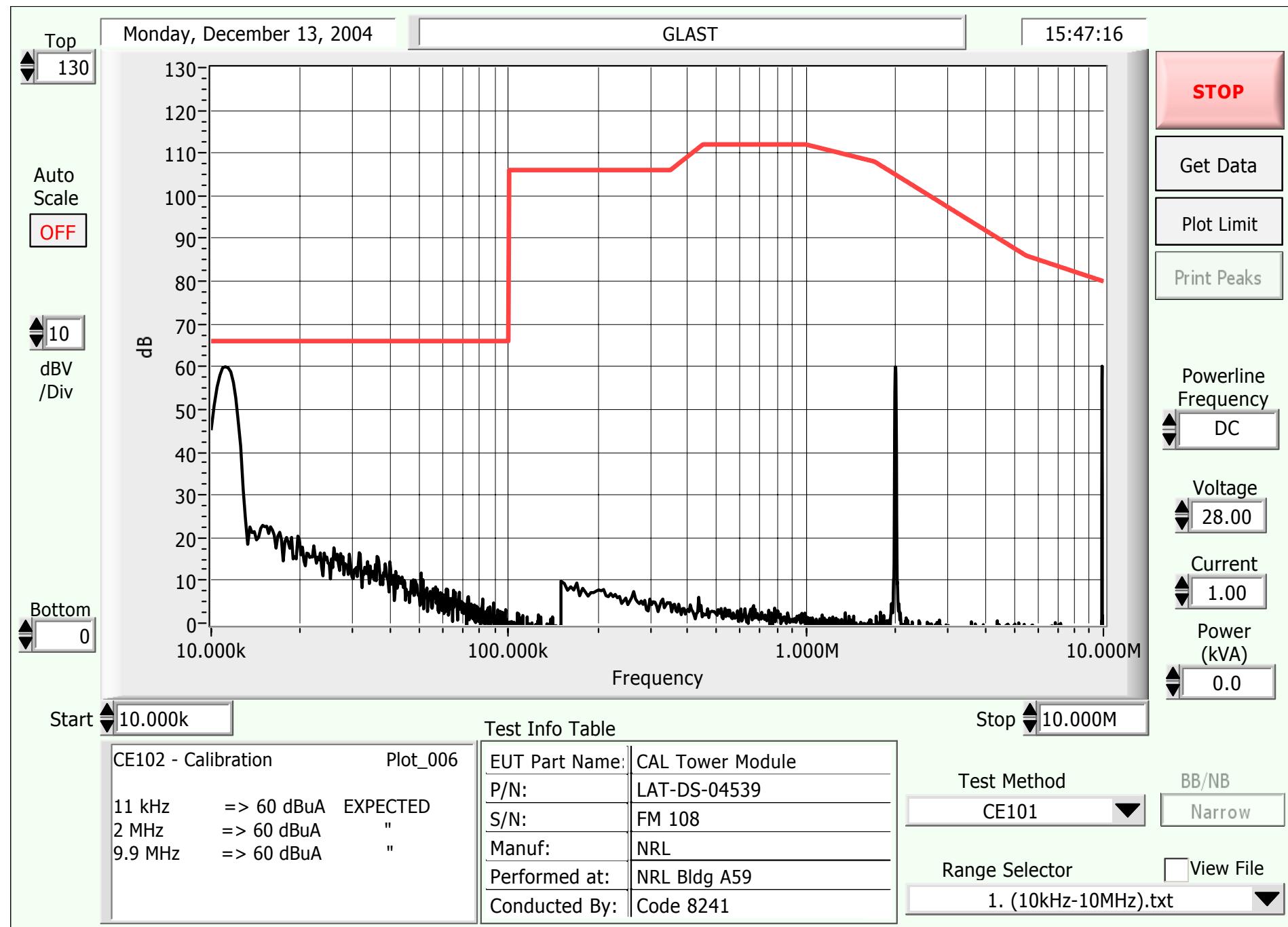
(Plot_017 to Plot_018)

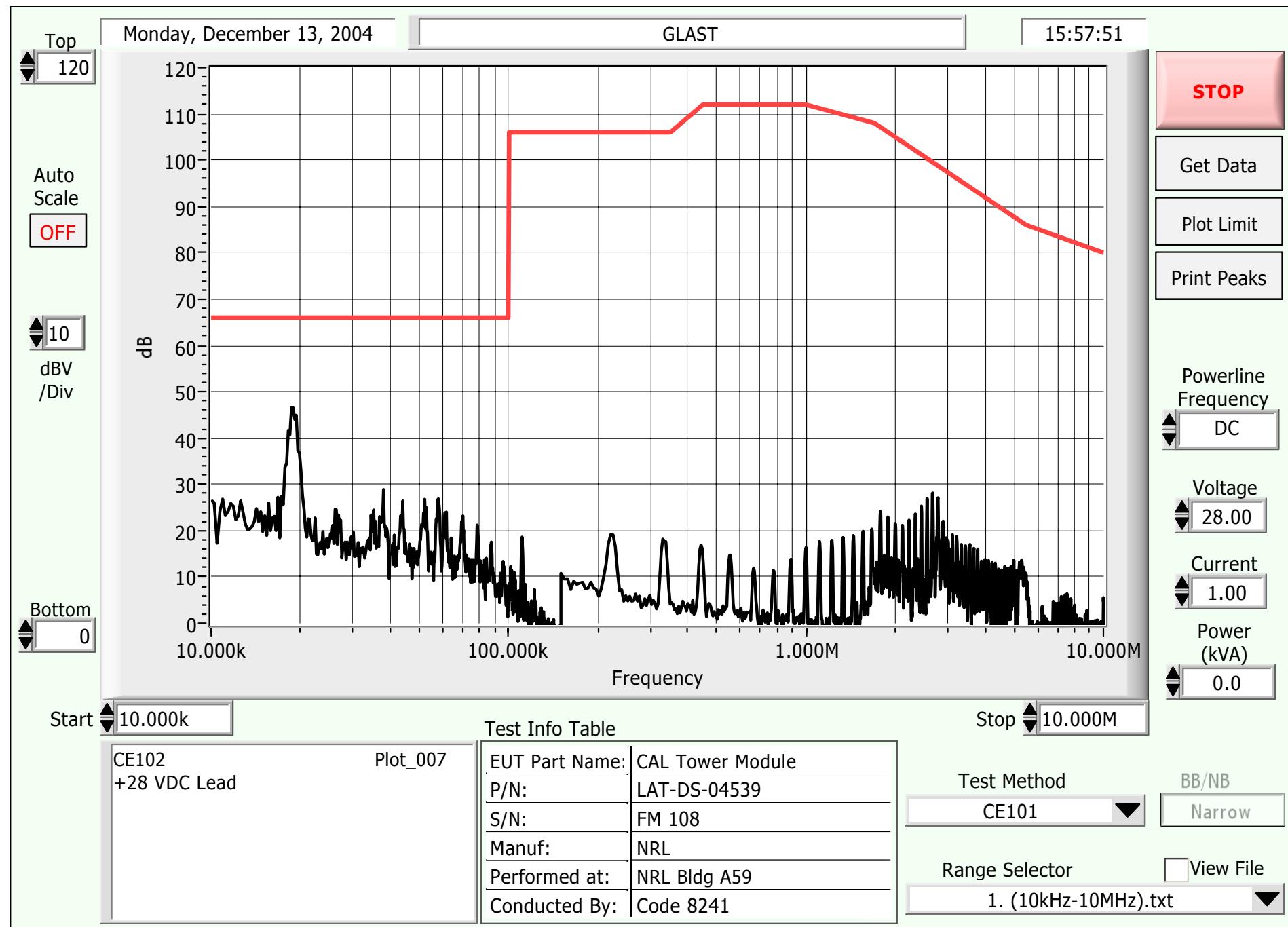


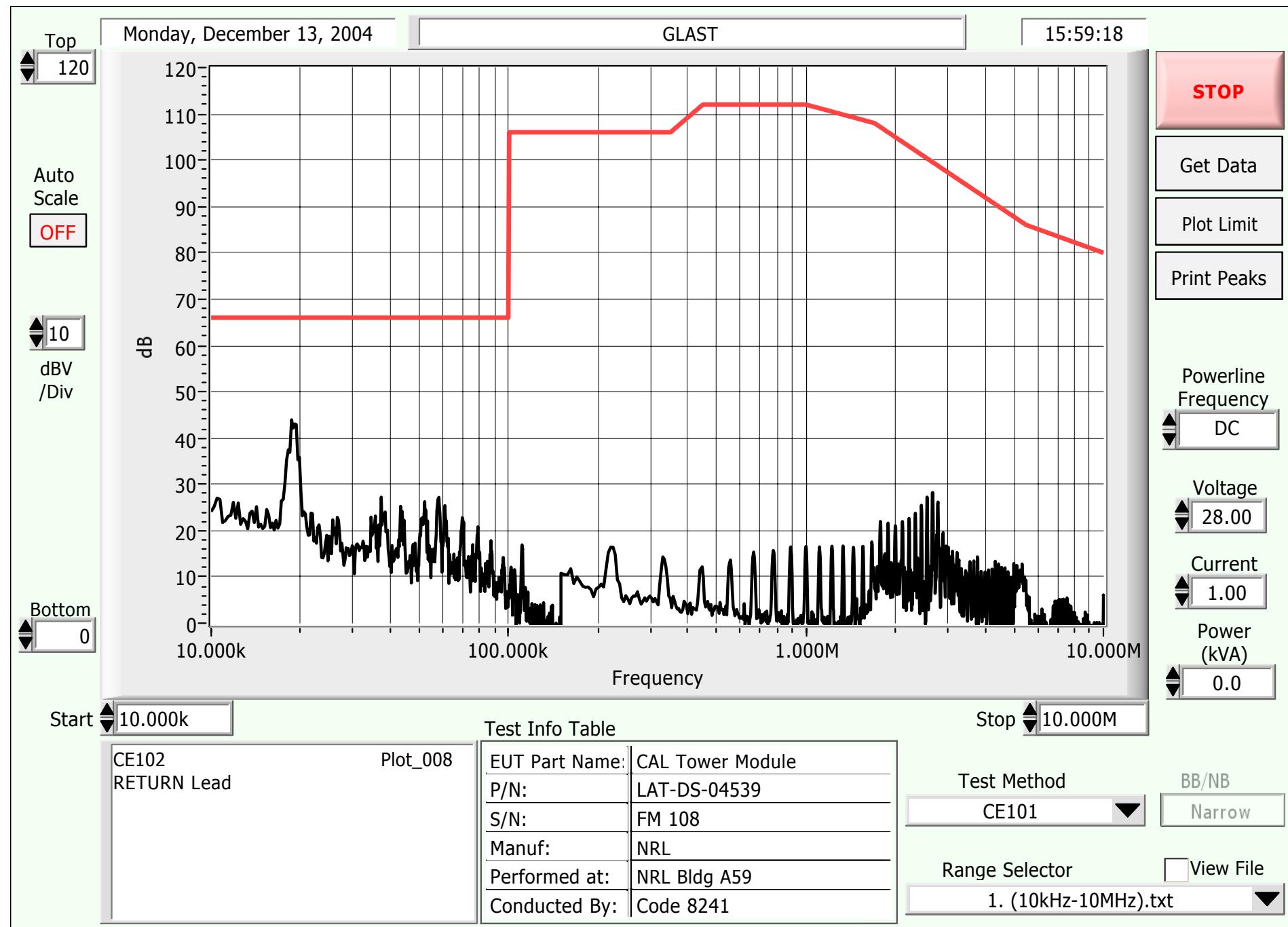


Appendix C – CE102 Test Data (FM108)

(Plot_006 to Plot_008)







Appendix D – CS102 Test Data (FM106)

(Plot_029 to Plot_036)

Tue, Dec 14, 2004

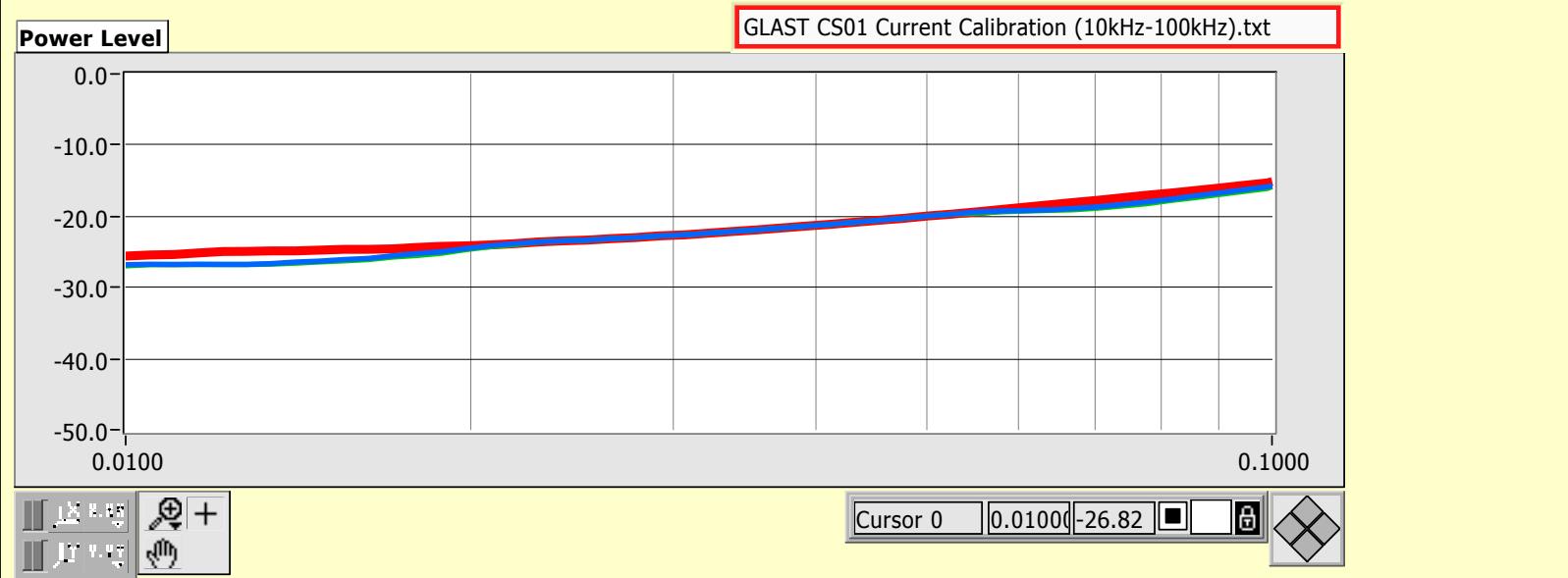
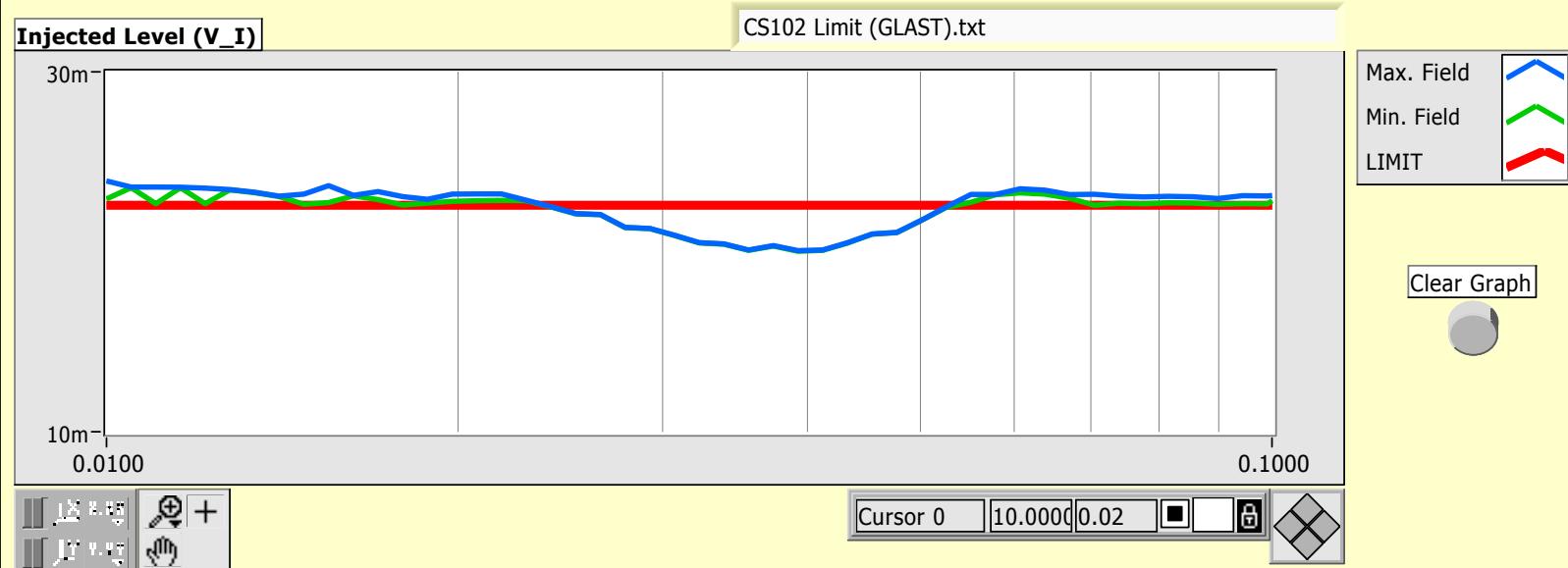
13:33

CS01/02

GLAST (FM106) in Combined Data Collect/Register Read Mode

Plot_029

Test Equipment	Setup	Monitor	Control	SWEEP RATES
Volt(Amp) Monitor <input type="button" value="E4440"/> CH L1 Ave <input type="checkbox"/> SigGen Model <input type="button" value="HP8643A Audio"/> Amplifier <input type="button" value="McIntosh"/>	From (MHz) <input type="text" value="0.010000"/> To (MHz) <input type="text" value="0.100000"/> <input type="button" value="Up"/> <input type="button" value="Down"/> Rate <input type="text" value="0.0500"/> Sweep <input type="button" value="Up"/> <input type="button" value="Down"/> Dwell (sec) <input type="text" value="3.0"/> Setpoint (V_I rms) <input type="text" value="86.0"/> dB μ <input checked="" type="radio"/> from File <input type="text" value="19.953m"/> <input type="radio"/> Bypass	Injected Level (V_I rms) <input type="text" value="20.558m"/> Frequency (MHz) <input type="text" value="0.100000"/> 86.26 dB μ Out of Tol <input type="radio"/> <input type="radio"/> Max Input <input type="text" value="-15.15"/> dBm SigGen Meter  <input type="text" value="-15.72"/> dBm	<input type="radio"/> Freq. Scan <input type="radio"/> Paused <input type="radio"/> RF <input type="radio"/> OFF <input type="button" value="STOP"/>	MIL-STD-461D 30 Hz - 1 MHz 0.01 1 MHz-30 MHz 0.005 30 MHz-1 GHz 0.0025 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005
CP-SINGER 91550-1b sn996 (11_18_04).txt				



Tue, Dec 14, 2004

13:39

CS01/02

GLAST (FM106) in Combined Data Collect/Register Read Mode

Plot_030

Test Equipment**Volt(Amp) Monitor**

E4440

CH L1 Ave **SigGen Model**

HP8643A Audio

Amplifier

None

CP-SINGER 91550-1b sn996 (11_18_04).txt

Setup

From (MHz) To (MHz)

0.100000 0.150000

0.0500 Rate Sweep

3.0 Dwell (sec) Up

Setpoint (V_I rms)

from File 398.107u

Bypass

52.0 dB μ **Monitor**

Injected Level (V_I rms) Frequency (MHz)

418.546u 0.150000

52.43 dB μ Out of Tol

Max Input

-20.41 dBm

SigGen Meter



-20.49 dBm

Control

Freq. Scan

Paused

RF

OFF

STOP

SWEEP RATES**MIL-STD-461D**

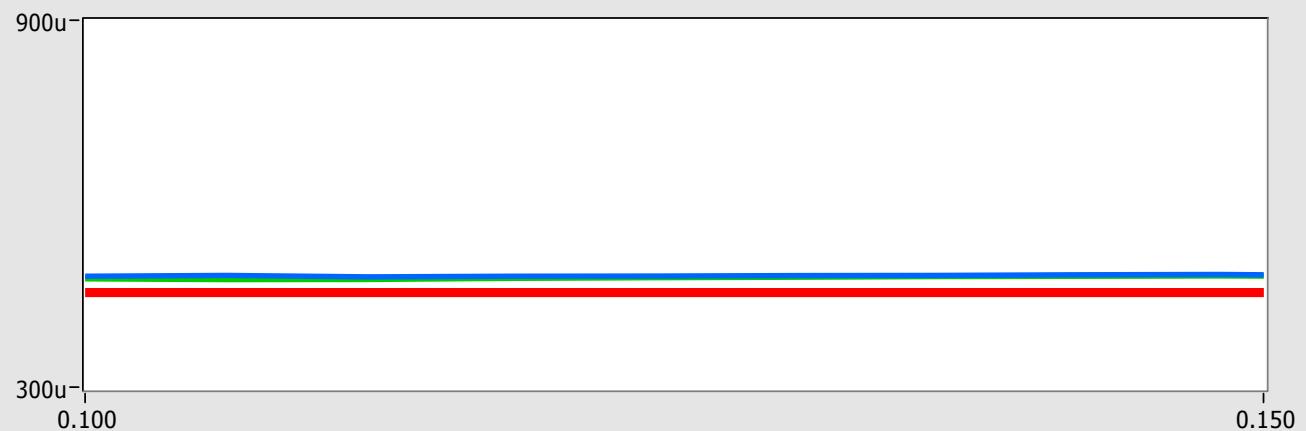
30 Hz - 1 MHz	0.01
1 MHz-30 MHz	0.005
30 MHz-1 GHz	0.0025
1 GHz - 8 GHz	0.001
8 GHz -40 GHz	0.0005

MIL-STD-461E

30 Hz - 1 MHz	0.05
1 MHz-30 MHz	0.01
30 MHz-1 GHz	0.005
1 GHz - 8 GHz	0.001
8 GHz -40 GHz	0.0005

Injected Level (V_I)

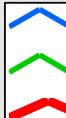
CS102 Limit (GLAST).txt



Max. Field

Min. Field

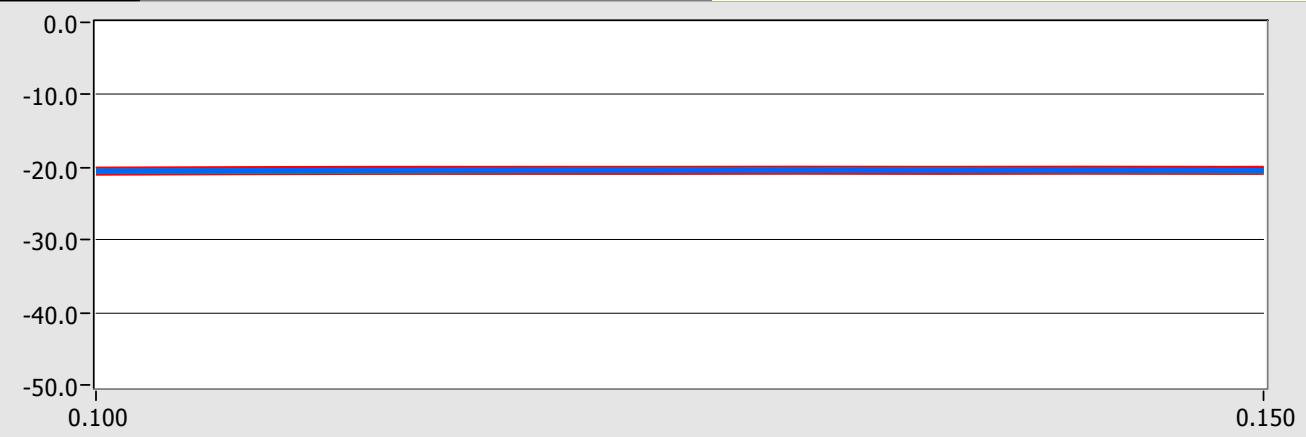
LIMIT



Clear Graph

**Power Level**

GLAST CS01 Current Calibration (100kHz-150kHz).txt



Cursor 0 0.10000 -20.52

LOCK



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13:48

CS01/02 +28 VDC Lead

GLAST (FM106) in Combined Data Collect/Register Read Mode

Plot_031

Test Equipment

Volt(Amp) Monitor

E4440

CH L1 Ave

SigGen Model

HP8643A Audio

Amplifier

None

CP-SINGER 91550-1b sn996 (11_18_04).txt

Setup

From (MHz) To (MHz)
0.150000 0.350000Rate Sweep
0.0500 Up
3.0 Dwell (sec)

Setpoint (V_I rms)

from File 398.107u

Bypass

52.0 dB μ

Monitor

Injected Level (V_I rms) Frequency (MHz)
419.672u 0.35000052.46 dB μ Out of Tol

Max Input -12.27 dBm

SigGen Meter



CS102 Limit (GLAST).txt

Control

Freq. Scan Paused

RF OFF

STOP

SWEEP RATES

MIL-STD-461D

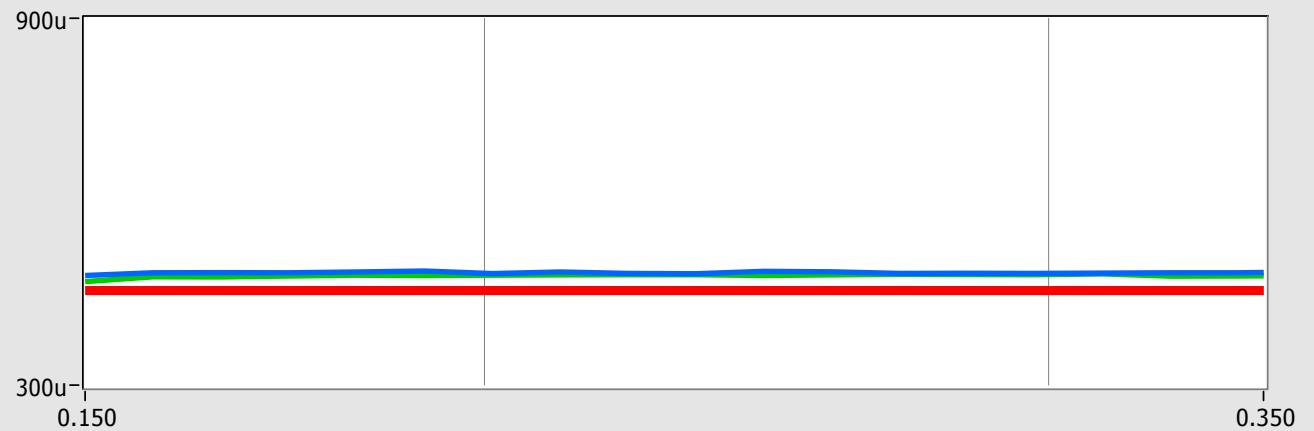
30 Hz - 1 MHz	0.01
1 MHz-30 MHz	0.005
30 MHz-1 GHz	0.0025
1 GHz - 8 GHz	0.001
8 GHz -40 GHz	0.0005

MIL-STD-461E

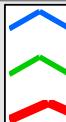
30 Hz - 1 MHz	0.05
1 MHz-30 MHz	0.01
30 MHz-1 GHz	0.005
1 GHz - 8 GHz	0.001
8 GHz -40 GHz	0.0005

Injected Level (V_I)

CS102 Limit (GLAST).txt



Max. Field



Min. Field



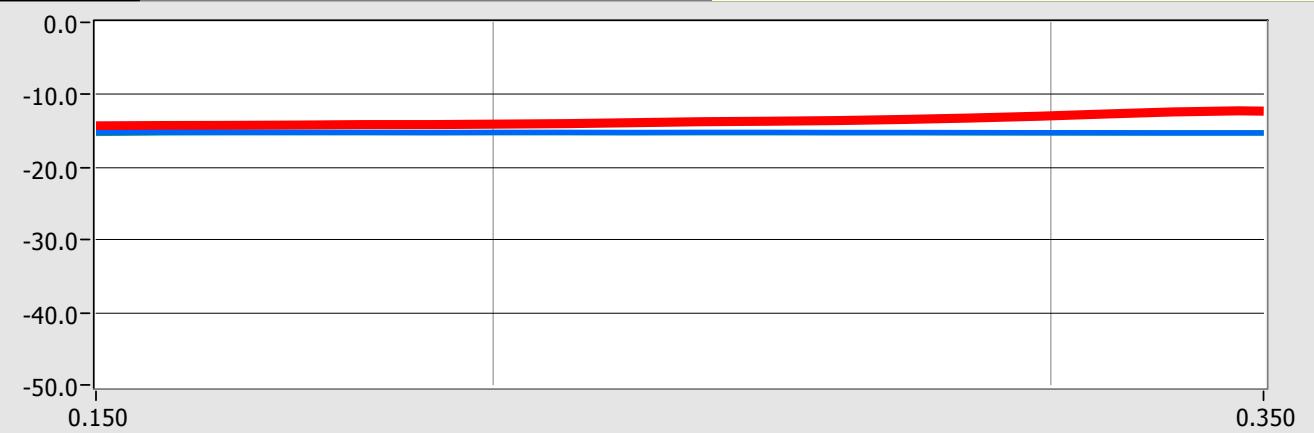
LIMIT

Clear Graph



Power Level

GLAST CS02 Current Calibration (150kHz-350kHz).txt



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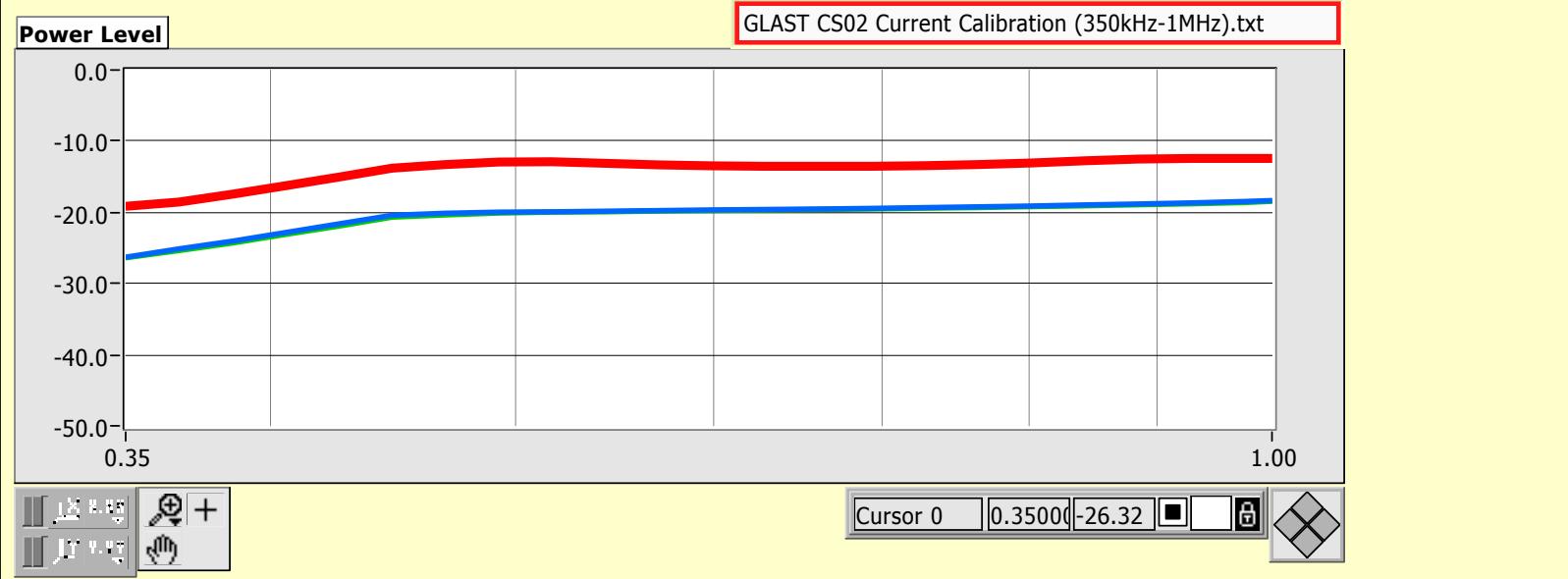
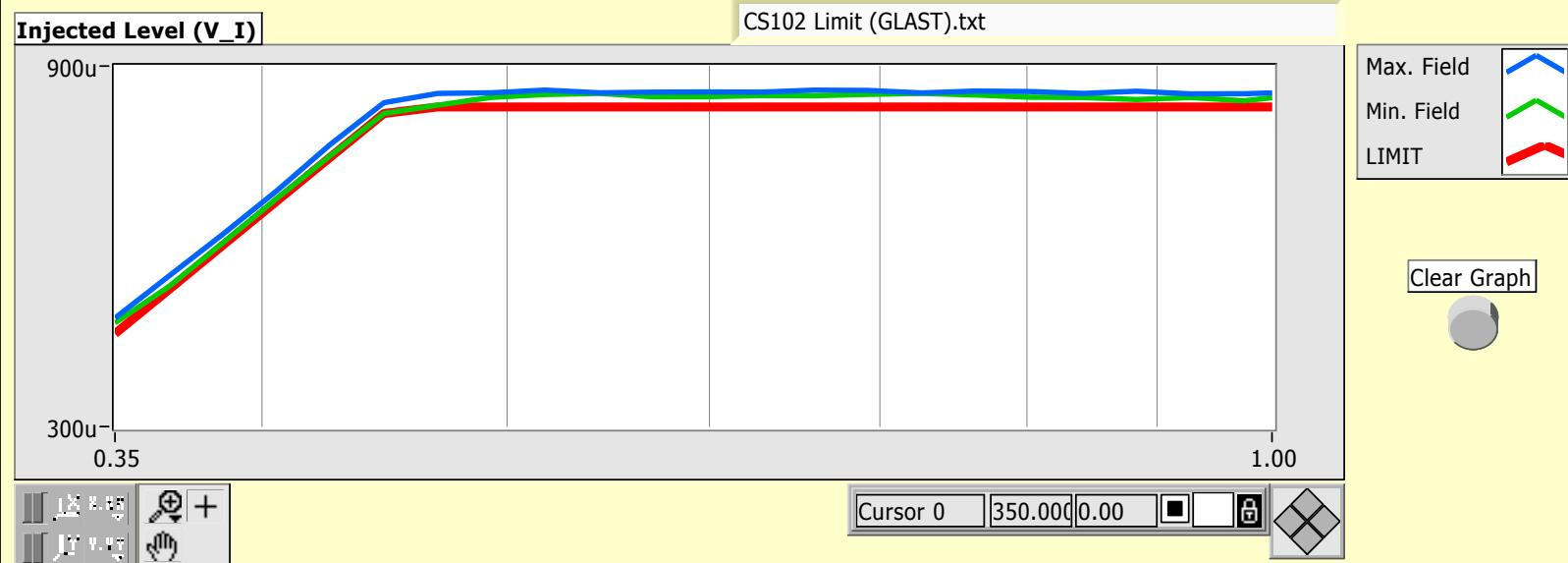
13:51

CS01/02 +28 VDC Lead GLAST (FM106) in Combined Data Collect/Register Read Mode

Plot_032

Test Equipment <div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;"> Volt(Amp) Monitor <input type="button" value="E4440"/> </div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;"> SigGen Model <input type="button" value="HP8643A RF Port"/> </div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;"> Amplifier <input type="button" value="None"/> </div>	Setup From (MHz) <input type="text" value="0.350000"/> To (MHz) <input type="text" value="1.000000"/> <input type="button" value="0.350000"/> <input type="button" value="1.000000"/> <input type="button" value="0.0500"/> Rate <input type="button" value="Sweep"/> Up <input type="button" value="3.0"/> Dwell (sec) Setpoint (V_I rms) <input type="text" value="58.0"/> dB μ <input checked="" type="radio"/> from File <input type="text" value="794.328u"/> <input type="radio"/> Bypass	Monitor Injected Level (V_I rms) <input type="text" value="826.036u"/> Frequency (MHz) <input type="text" value="1.000000"/> 58.34 dB μ Out of Tol <input type="radio"/> Max Input <input type="text" value="-12.45"/> dBm SigGen Meter <input type="text" value="-18.36"/> dBm	Control <input type="radio"/> Freq. Scan Paused <input type="radio"/> RF OFF <input style="background-color: red; color: white; width: 100%; height: 100%;" type="button" value="STOP"/>
		SWEEP RATES MIL-STD-461D 30 Hz - 1 MHz 0.01 1 MHz-30 MHz 0.005 30 MHz-1 GHz 0.0025 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005	
		MIL-STD-461E 30 Hz - 1 MHz 0.05 1 MHz-30 MHz 0.01 30 MHz-1 GHz 0.005 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005	

CP-SINGER 91550-1b sn996 (11_18_04).txt



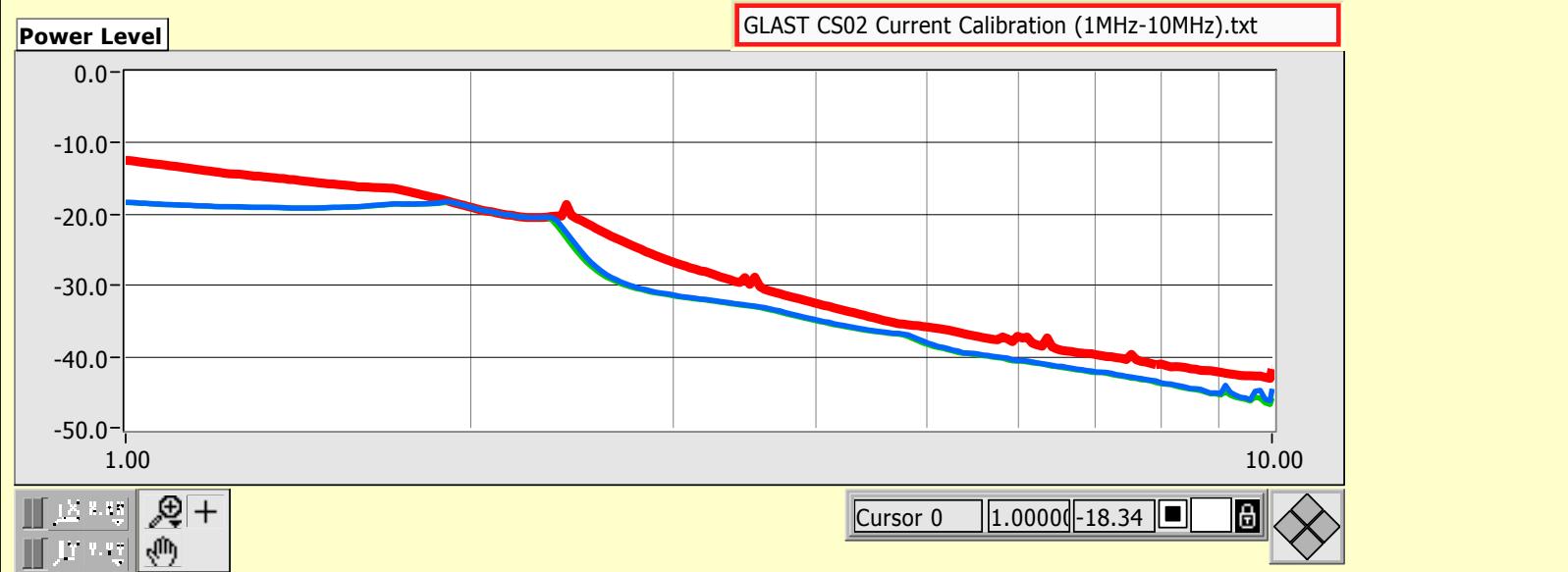
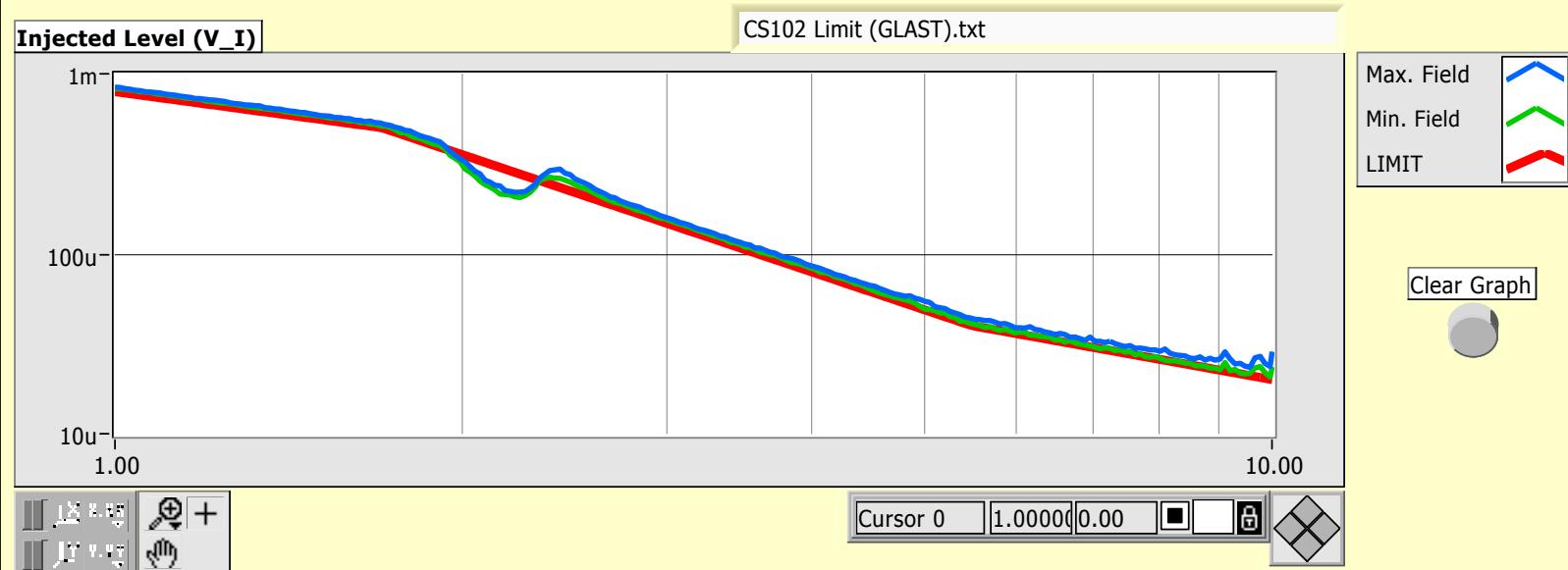
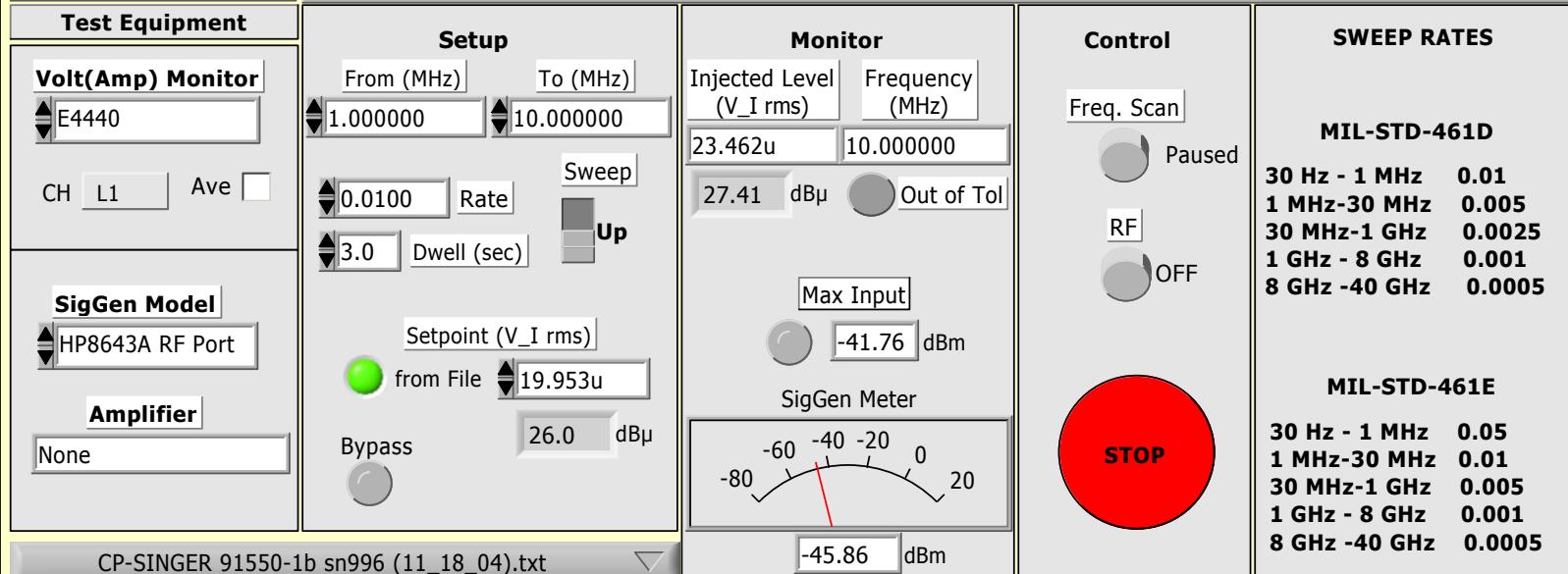
Tue, Dec 14, 2004

13:54

CS01/02 +28 VDC Lead

GLAST (FM106) in Combined Data Collect/Register Read Mode

Plot_033



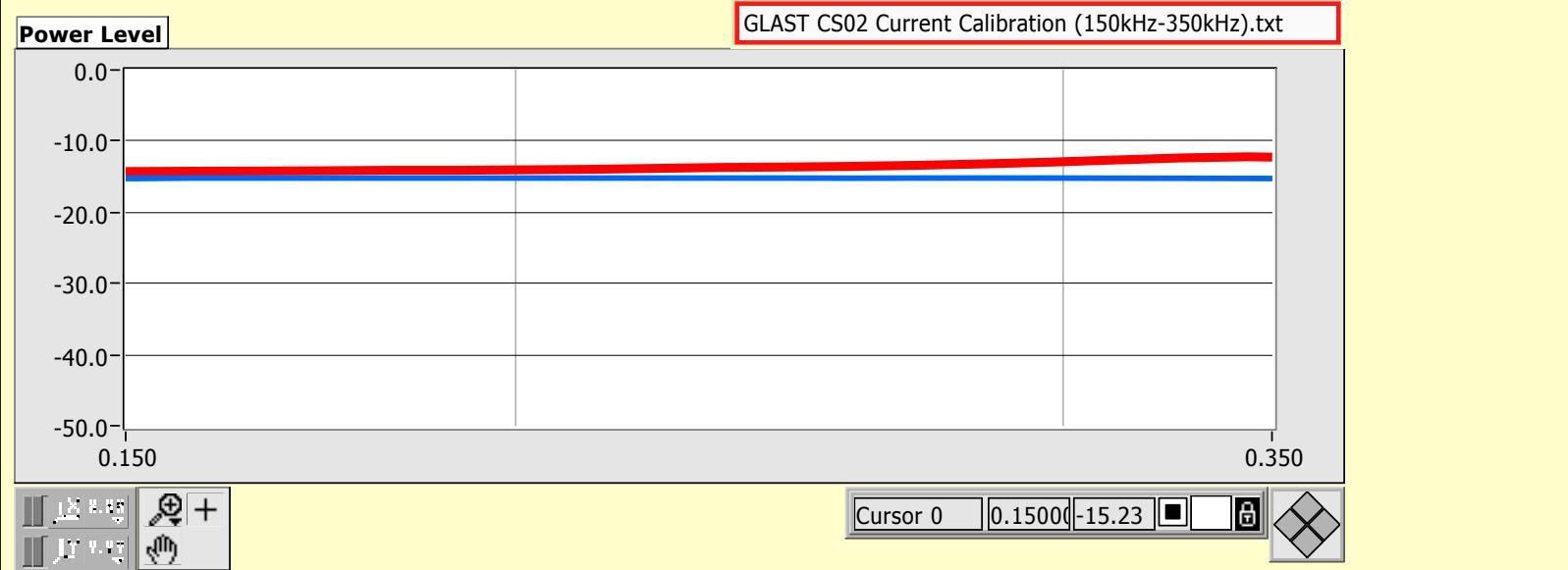
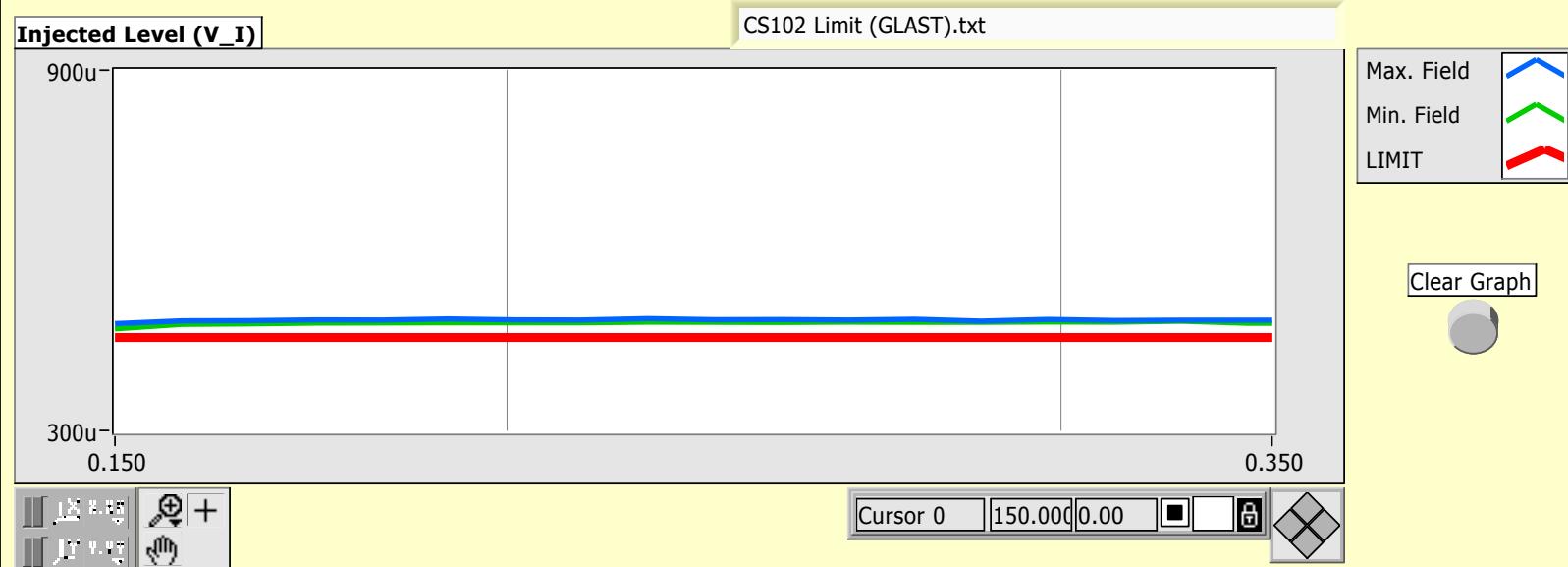
Tue, Dec 14, 2004

14:16

CS01/02 RETURN Lead GLAST (FM106) in Combined Data Collect/Register Read Mode

Plot_034

Test Equipment	Setup	Monitor	Control	SWEEP RATES
Volt(Amp) Monitor <input type="button" value="E4440"/> CH L1 Ave <input type="checkbox"/> SigGen Model <input type="button" value="HP8643A Audio"/> Amplifier None	From (MHz) 0.150000 To (MHz) 0.350000 Rate 0.0500 Sweep Up Dwell (sec) 3.0 Setpoint (V_I rms) from File 398.107u Bypass	Injected Level (V_I rms) 415.776u Frequency (MHz) 0.350000 52.38 dB μ Out of Tol Max Input -12.27 dBm SigGen Meter -15.26 dBm	<input checked="" type="radio" value="Freq. Scan"/> Freq. Scan <input type="radio" value="RF"/> RF Paused OFF <input style="background-color: red; color: white; width: 100%; height: 100%;" type="button" value="STOP"/>	MIL-STD-461D 30 Hz - 1 MHz 0.01 1 MHz-30 MHz 0.005 30 MHz-1 GHz 0.0025 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005
		MIL-STD-461E 30 Hz - 1 MHz 0.05 1 MHz-30 MHz 0.01 30 MHz-1 GHz 0.005 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005		
CP-SINGER 91550-1b sn996 (11_18_04).txt				



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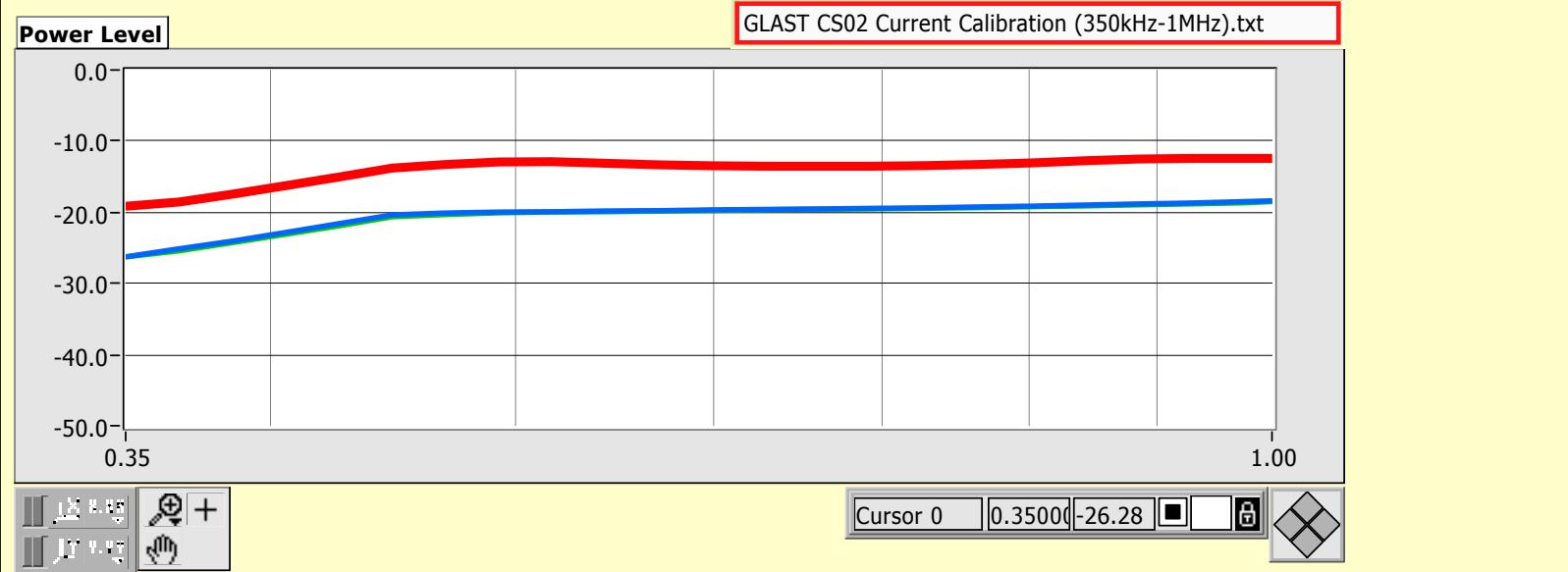
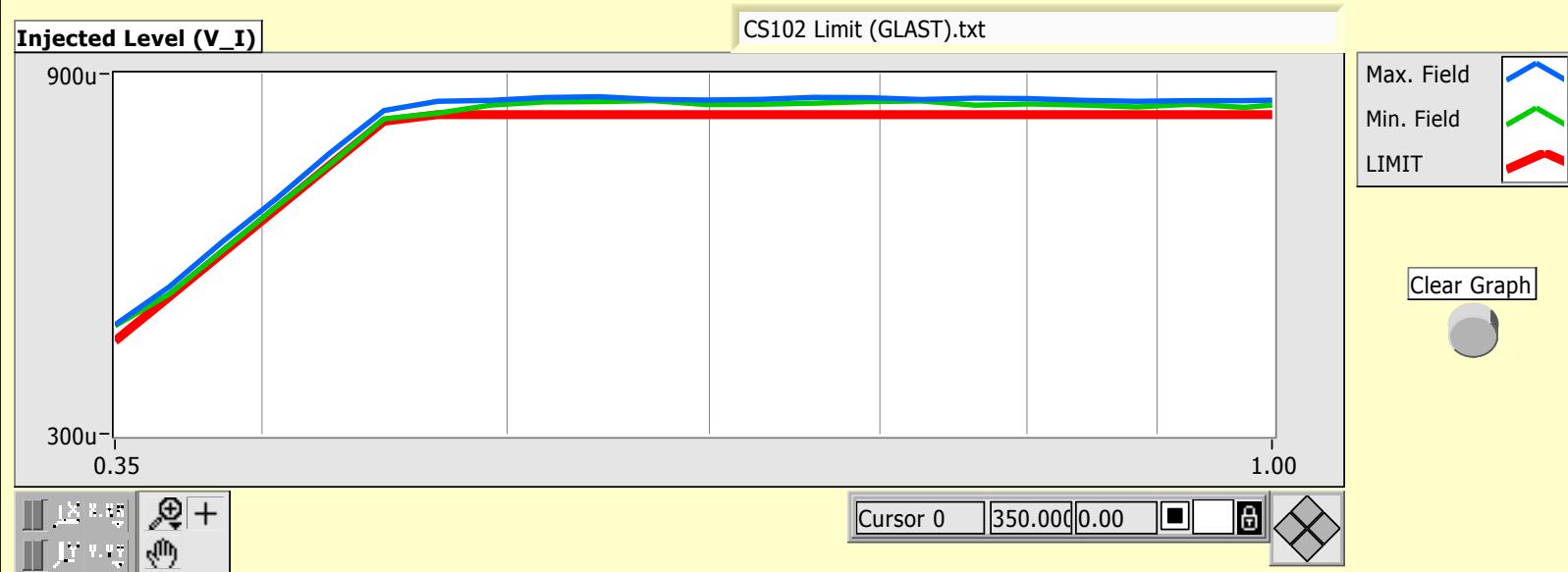
14:19

CS01/02 RETURN Lead GLAST (FM106) in Combined Data Collect/Register Read Mode

Plot_035

Test Equipment	Setup	Monitor	Control	SWEEP RATES
Volt(Amp) Monitor <input type="button" value="E4440"/> CH L1 Ave <input type="checkbox"/> SigGen Model <input type="button" value="HP8643A RF Port"/> Amplifier None	From (MHz) <input type="text" value="0.350000"/> To (MHz) <input type="text" value="1.000000"/> <input type="button" value="Up"/> <input type="button" value="Down"/> Rate <input type="text" value="0.0500"/> Sweep <input type="button" value="Up"/> <input type="button" value="Down"/> Dwell (sec) <input type="text" value="3.0"/> Setpoint (V_I rms) from File <input type="text" value="794.328u"/> <input type="button" value="Bypass"/> <input style="margin-left: 20px;" type="text" value="58.0"/> dB μ	Injected Level (V_I rms) <input type="text" value="826.511u"/> Frequency (MHz) <input type="text" value="1.000000"/> 58.34 dB μ Out of Tol <input type="button" value="Max Input"/> -12.45 dBm SigGen Meter -18.39 dBm	<input type="button" value="Freq. Scan"/> Paused <input type="button" value="RF"/> OFF <input style="background-color: red; color: white; width: 100%; height: 100%;" type="button" value="STOP"/>	MIL-STD-461D 30 Hz - 1 MHz 0.01 1 MHz-30 MHz 0.005 30 MHz-1 GHz 0.0025 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005 MIL-STD-461E 30 Hz - 1 MHz 0.05 1 MHz-30 MHz 0.01 30 MHz-1 GHz 0.005 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005

CP-SINGER 91550-1b sn996 (11_18_04).txt



Tue, Dec 14, 2004

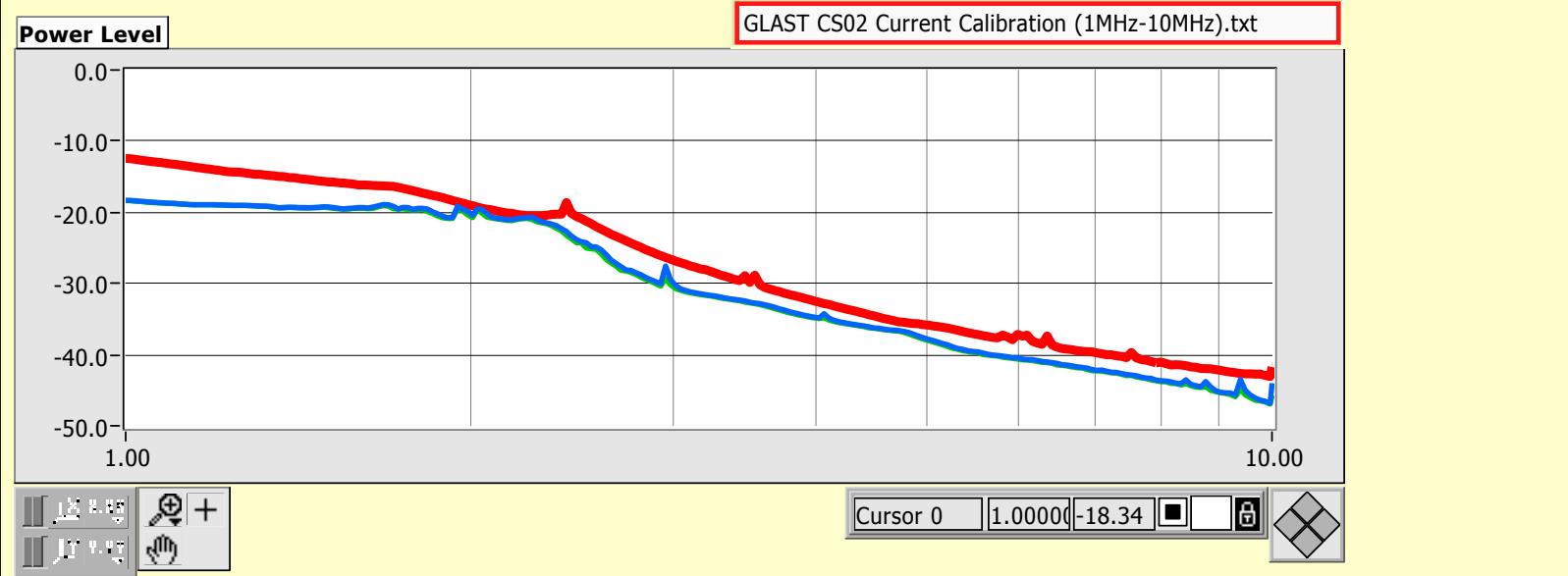
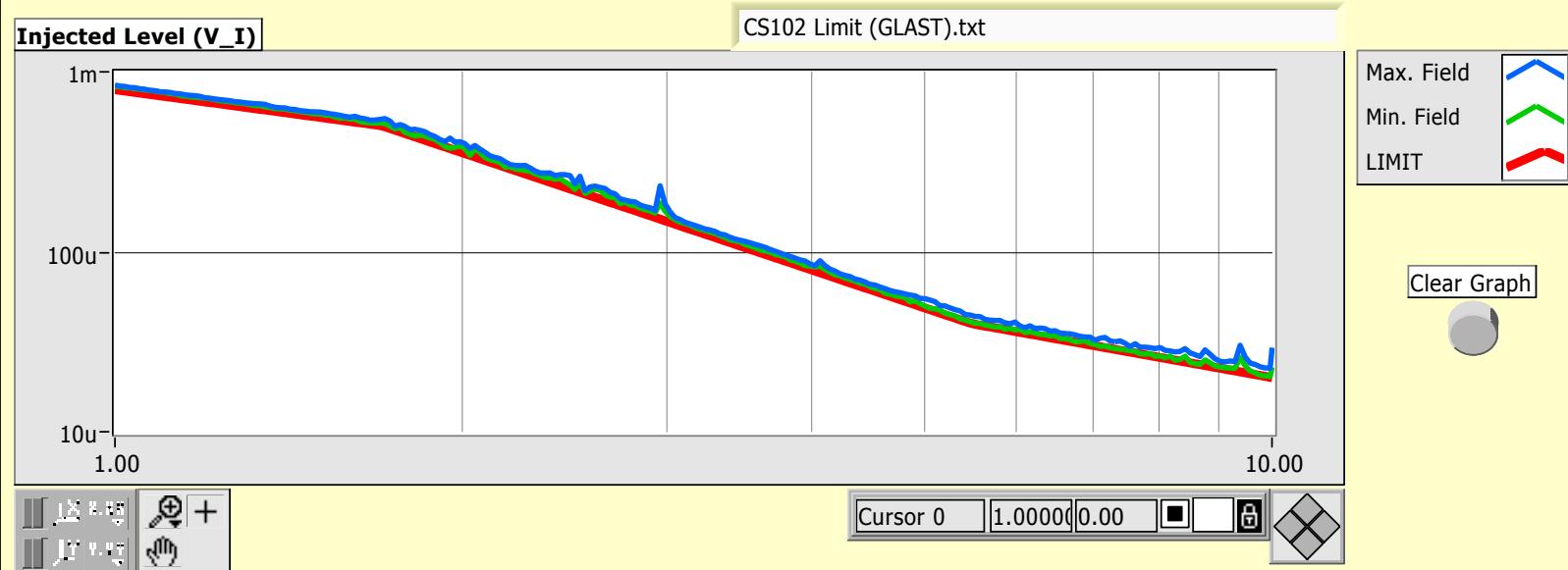
14:22

CS01/02 RETURN Lead GLAST (FM106) in Combined Data Collect/Register Read Mode

Plot_036

Test Equipment	Setup	Monitor	Control	SWEEP RATES
Volt(Amp) Monitor E4440	From (MHz) 1.000000 To (MHz) 10.000000 Sweep Rate 0.0100 dB μ s Dwell (sec) 3.0 Up Setpoint (V_I rms) from File 19.953u Bypass	Injected Level (V_I rms) 22.744u Frequency (MHz) 10.000000 27.14 dB μ Out of Tol Max Input -41.76 dBm SigGen Meter -60 -40 -20 0 20 -80 -45.73 dBm	Freq. Scan Paused RF OFF STOP	MIL-STD-461D 30 Hz - 1 MHz 0.01 1 MHz-30 MHz 0.005 30 MHz-1 GHz 0.0025 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005
SigGen Model HP8643A RF Port				MIL-STD-461E 30 Hz - 1 MHz 0.05 1 MHz-30 MHz 0.01 30 MHz-1 GHz 0.005 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005
Amplifier None				

CP-SINGER 91550-1b sn996 (11_18_04).txt



Appendix E – CS102 Test Data (FM107)

(Plot_019 to Plot_026)

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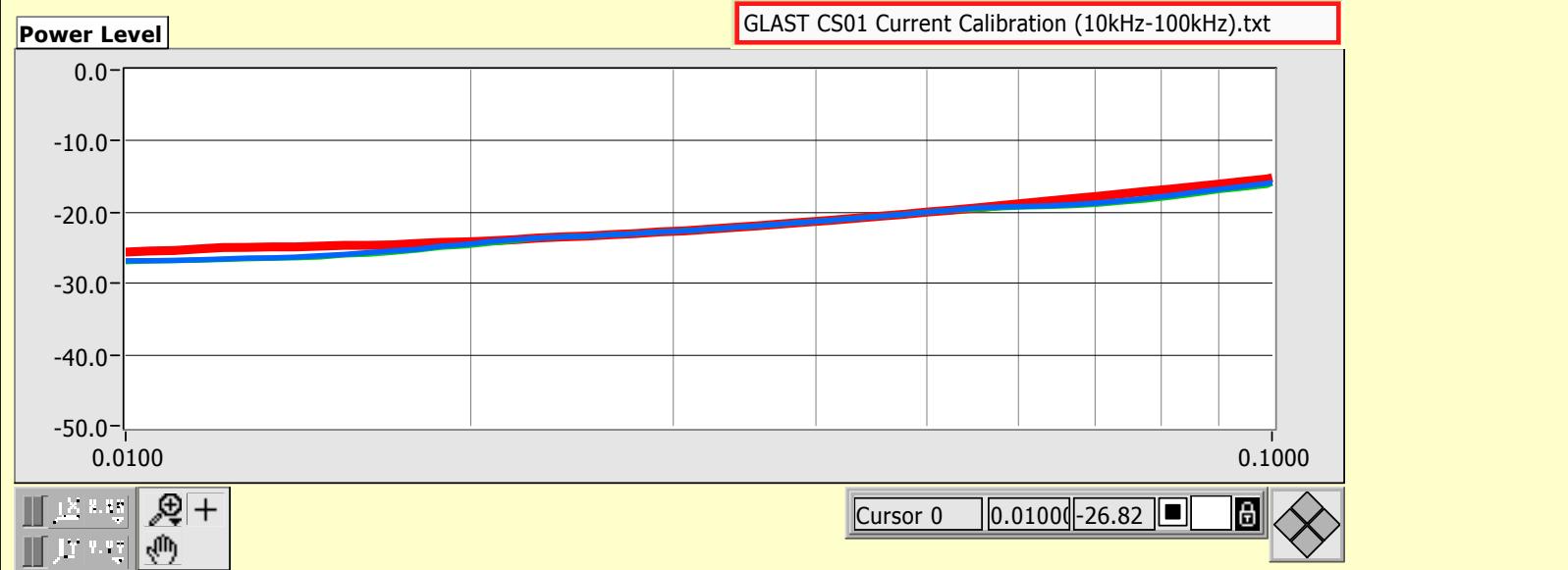
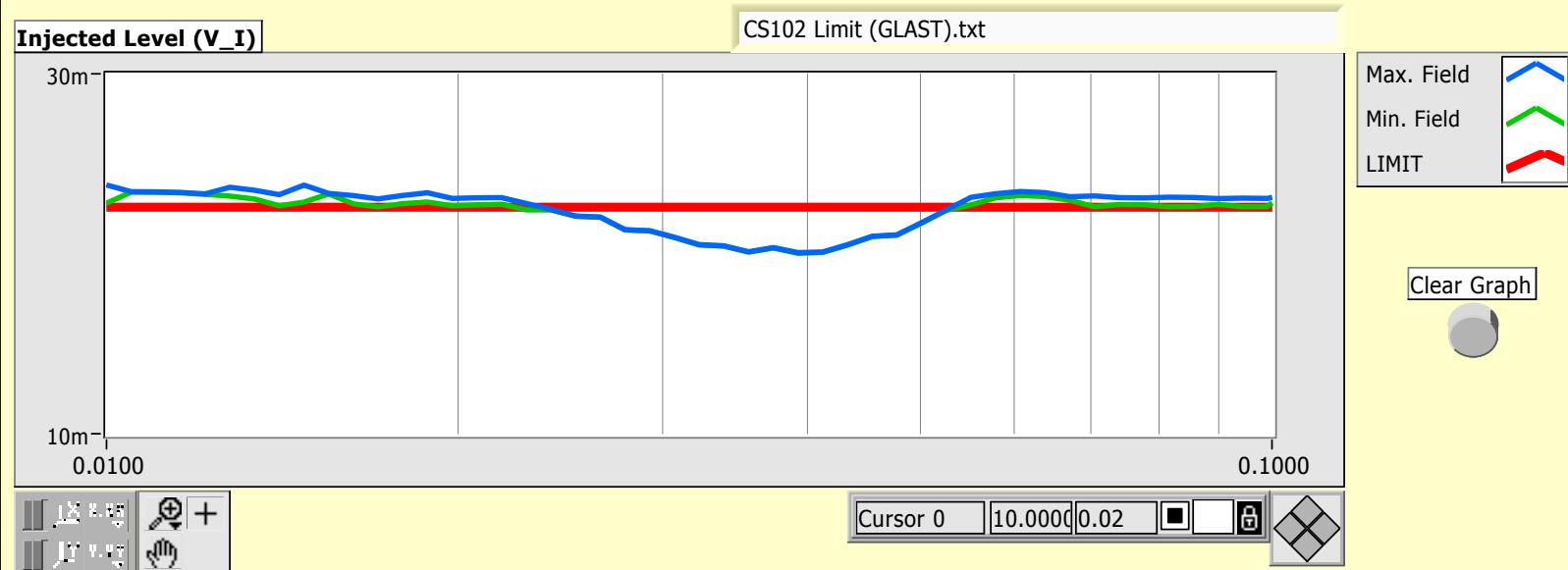
9:21

CS01/02

GLAST (FM107) in Combined Data Collect/Register Read Mode

Plot_019

Test Equipment <div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;"> Volt(Amp) Monitor <input type="button" value="E4440"/> </div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;"> SigGen Model <input type="button" value="HP8643A Audio"/> </div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;"> Amplifier <input type="button" value="McIntosh"/> </div> <p>CP-SINGER 91550-1b sn996 (11_18_04).txt</p>	Setup From (MHz) <input type="text" value="0.010000"/> To (MHz) <input type="text" value="0.100000"/> <input type="button" value="Up"/> <input type="button" value="Down"/> Rate <input type="text" value="0.0500"/> Sweep <input type="button" value="Up"/> Dwell (sec) <input type="text" value="3.0"/> <input type="button" value="Up"/> Setpoint (V_I rms) <input type="text" value="86.0"/> dB μ from File <input type="text" value="19.953m"/> <input type="button" value="Bypass"/>	Monitor Injected Level (V_I rms) <input type="text" value="20.574m"/> Frequency (MHz) <input type="text" value="0.100000"/> 86.27 dB μ <input type="radio"/> Out of Tol <input type="radio"/> <input type="button" value="Max Input"/> SigGen Meter <input type="text" value="-15.79"/> dBm	Control <input type="radio"/> Freq. Scan <input type="radio"/> Paused <input type="radio"/> RF <input type="radio"/> OFF <input style="background-color: red; color: white; width: 100%; height: 100%;" type="button" value="STOP"/>
		SWEEP RATES MIL-STD-461D 30 Hz - 1 MHz 0.01 1 MHz-30 MHz 0.005 30 MHz-1 GHz 0.0025 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005 MIL-STD-461E 30 Hz - 1 MHz 0.05 1 MHz-30 MHz 0.01 30 MHz-1 GHz 0.005 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005	



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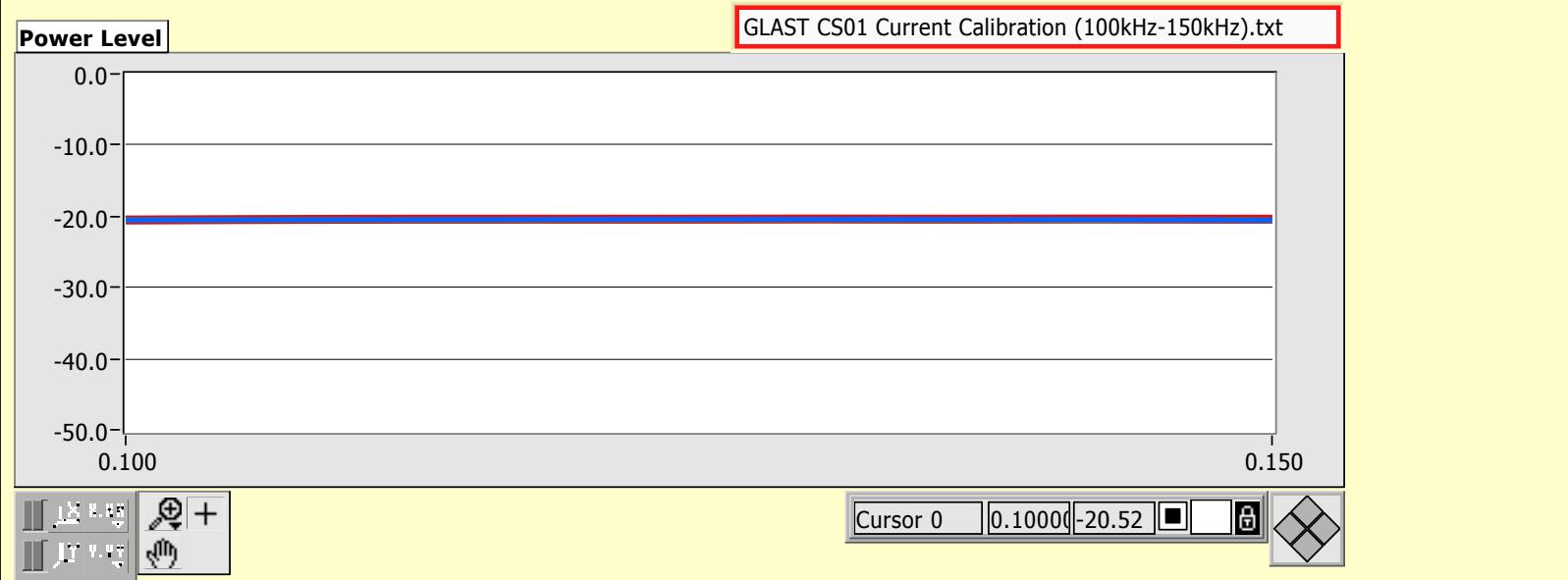
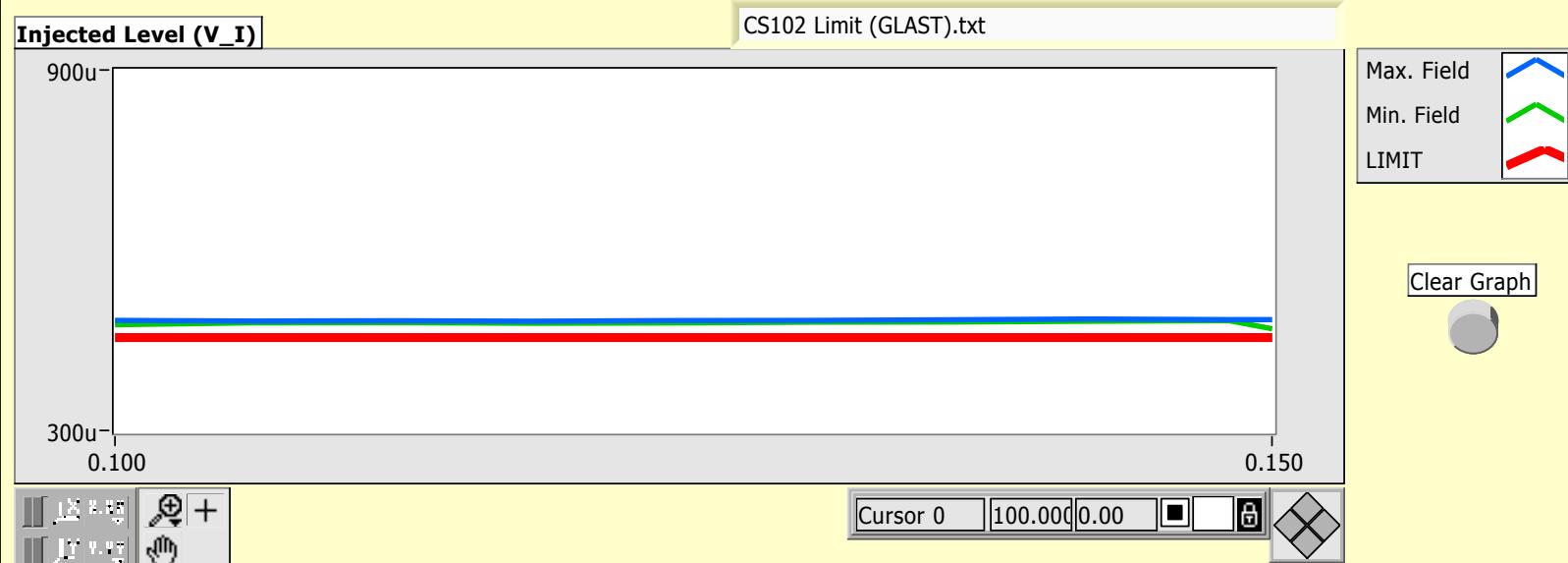
9:27

CS01/02

GLAST (FM107) in Combined Data Collect/Register Read Mode

Plot_020

Test Equipment	Setup	Monitor	Control	SWEEP RATES
Volt(Amp) Monitor <input type="button" value="E4440"/> CH L1 Ave <input type="checkbox"/> SigGen Model <input type="button" value="HP8643A Audio"/> Amplifier None	From (MHz) <input type="text" value="0.100000"/> To (MHz) <input type="text" value="0.150000"/> Rate <input type="text" value="0.0500"/> Sweep <input type="button" value="Up"/> Dwell (sec) <input type="text" value="3.0"/> Setpoint (V_I rms) from File <input type="text" value="398.107u"/> Bypass <input type="button" value="52.0 dBμ"/>	Injected Level (V_I rms) <input type="text" value="419.269u"/> Frequency (MHz) <input type="text" value="0.150000"/> 52.45 dBμ <input type="radio"/> Out of Tol	Freq. Scan <input type="radio"/> Paused RF <input type="radio"/> OFF <input style="background-color: red; color: white; width: 100%; height: 100%;" type="button" value="STOP"/>	MIL-STD-461D 30 Hz - 1 MHz 0.01 1 MHz-30 MHz 0.005 30 MHz-1 GHz 0.0025 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005
		Max Input <input type="text" value="-20.41 dBm"/> SigGen Meter <input type="text" value="-20.58 dBm"/>	MIL-STD-461E 30 Hz - 1 MHz 0.05 1 MHz-30 MHz 0.01 30 MHz-1 GHz 0.005 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005	
CP-SINGER 91550-1b sn996 (11_18_04).txt				



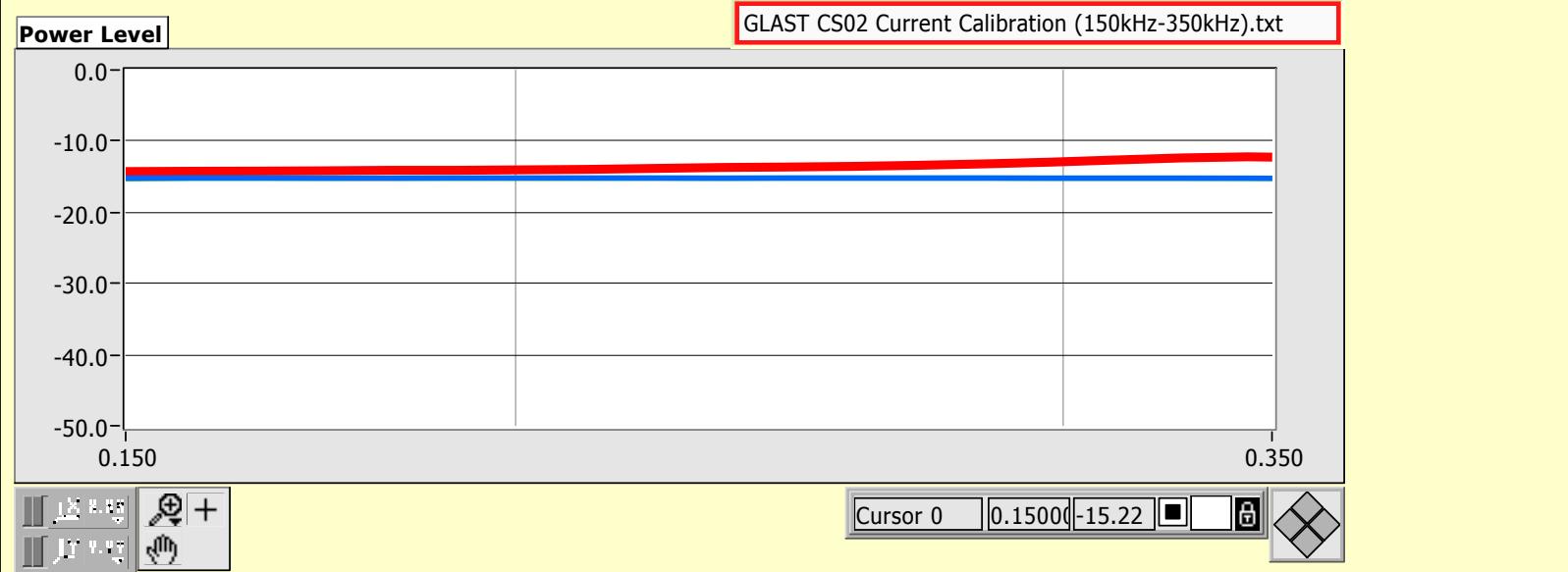
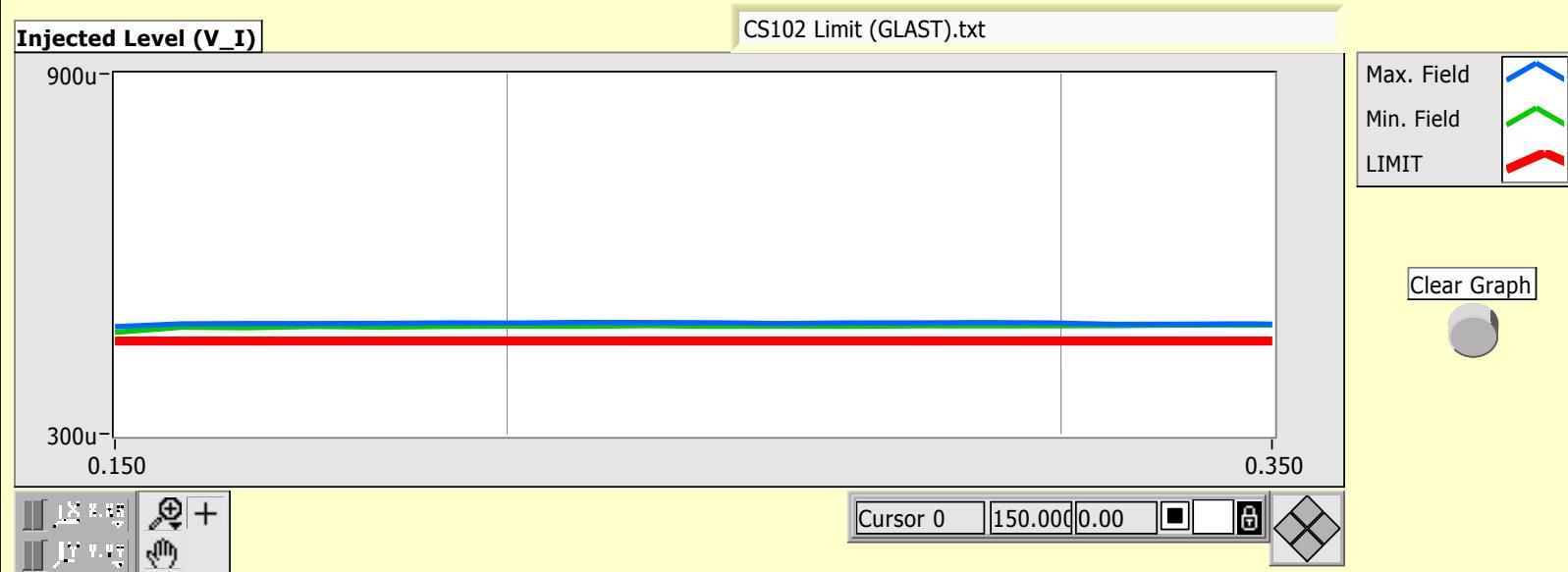
Tue, Dec 14, 2004

9:41

CS01/02 +28 VDC Lead GLAST (FM107) in Combined Data Collect/Register Read Mode

Plot_021

Test Equipment <div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;"> Volt(Amp) Monitor <input type="button" value="E4440"/> </div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;"> SigGen Model <input type="button" value="HP8643A Audio"/> </div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;"> Amplifier <input type="button" value="None"/> </div> <p>CP-SINGER 91550-1b sn996 (11_18_04).txt</p>	Setup From (MHz) <input type="text" value="0.150000"/> To (MHz) <input type="text" value="0.350000"/> <input type="button" value="Up"/> <input type="button" value="Down"/> Rate <input type="text" value="0.0500"/> Sweep <input type="button" value="Up"/> Dwell (sec) <input type="text" value="3.0"/> <input type="button" value="Up"/> Setpoint (V_I rms) <input type="text" value="52.0"/> dB μ <input checked="" type="radio"/> from File <input type="text" value="398.107u"/> <input type="radio"/> Bypass	Monitor Injected Level (V_I rms) <input type="text" value="418.466u"/> Frequency (MHz) <input type="text" value="0.350000"/> 52.43 dB μ <input type="radio"/> Out of Tol <input type="radio"/> Max Input <input type="text" value="-12.27"/> dBm SigGen Meter <input type="text" value="-15.25"/> dBm	Control <input type="radio"/> Freq. Scan <input type="radio"/> Paused <input type="radio"/> RF <input type="radio"/> OFF <input style="background-color: red; color: white; width: 100%; height: 40px; border: none; border-radius: 50%;" type="button" value="STOP"/>	SWEEP RATES MIL-STD-461D 30 Hz - 1 MHz 0.01 1 MHz-30 MHz 0.005 30 MHz-1 GHz 0.0025 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005 MIL-STD-461E 30 Hz - 1 MHz 0.05 1 MHz-30 MHz 0.01 30 MHz-1 GHz 0.005 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005
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9:44

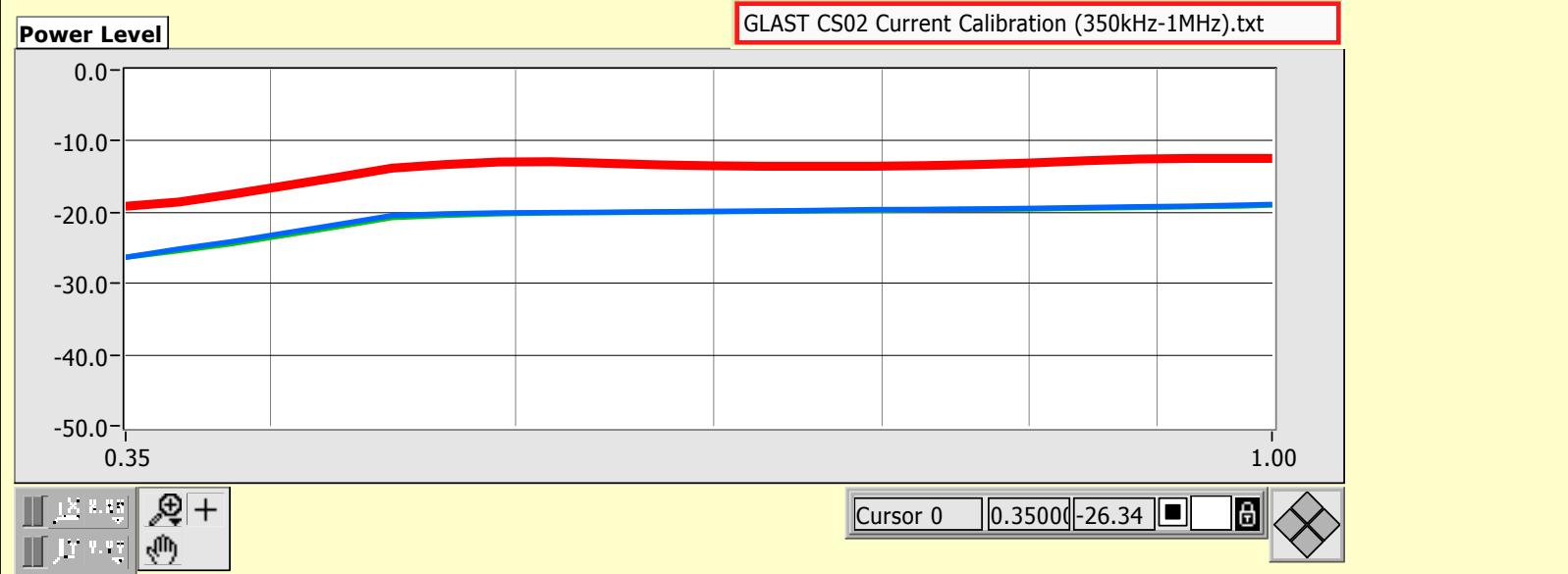
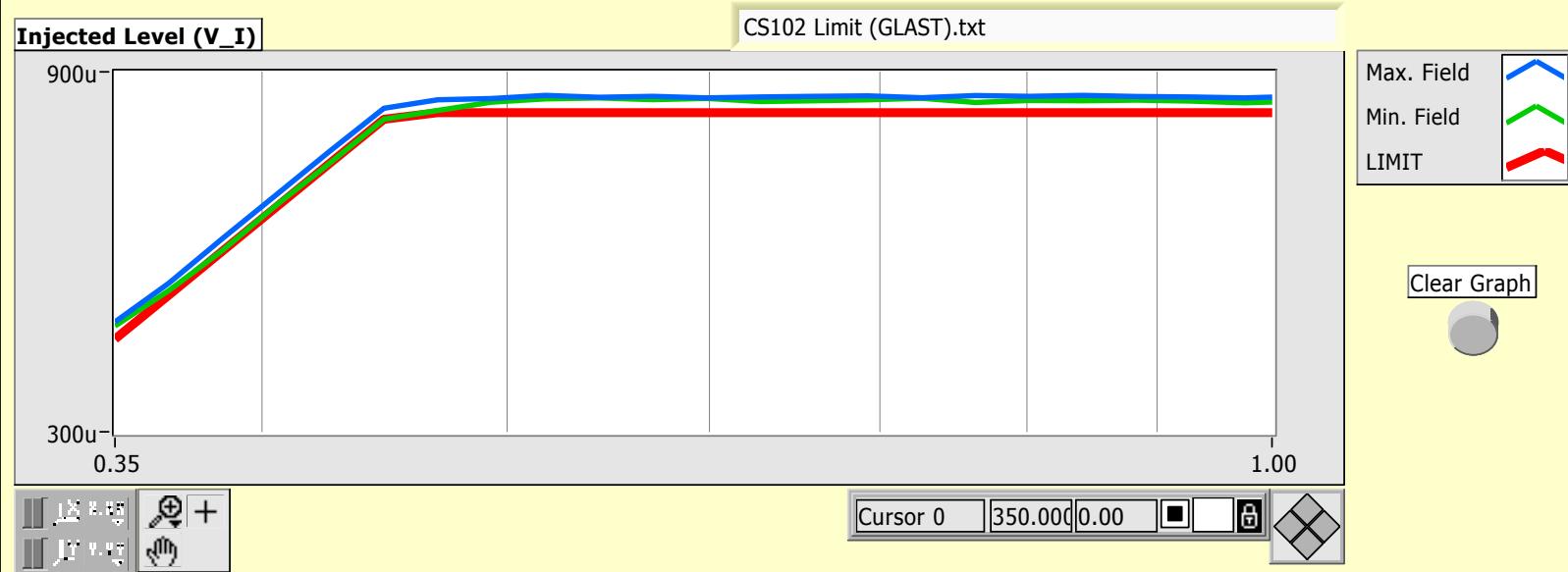
CS01/02 +28 VDC Lead

GLAST (FM107) in Combined Data Collect/Register Read Mode

Plot_022

Test Equipment	Setup	Monitor	Control	SWEEP RATES
Volt(Amp) Monitor E4440	From (MHz) 0.350000 To (MHz) 1.000000 Sweep Rate 0.0500 Dwell (sec) 3.0 Up	Injected Level (V_I rms) 832.624u Frequency (MHz) 1.000000 58.41 dB μ Out of Tol Max Input -12.45 dBm SigGen Meter -80 -60 -40 -20 0 20 -18.91 dBm	Freq. Scan Paused RF OFF STOP	MIL-STD-461D 30 Hz - 1 MHz 0.01 1 MHz-30 MHz 0.005 30 MHz-1 GHz 0.0025 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005
SigGen Model HP8643A RF Port	Setpoint (V_I rms) from File 794.328u			MIL-STD-461E 30 Hz - 1 MHz 0.05 1 MHz-30 MHz 0.01 30 MHz-1 GHz 0.005 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005
Amplifier None	Bypass	58.0 dB μ		

CP-SINGER 91550-1b sn996 (11_18_04).txt



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9:47

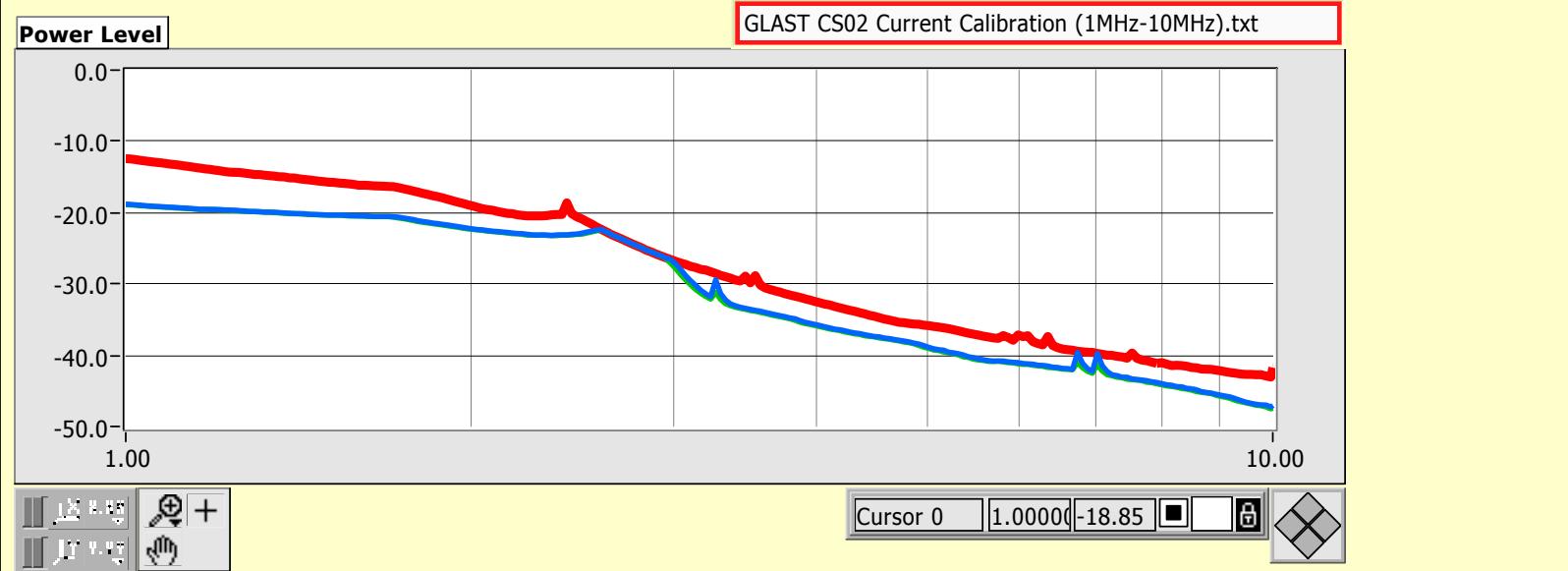
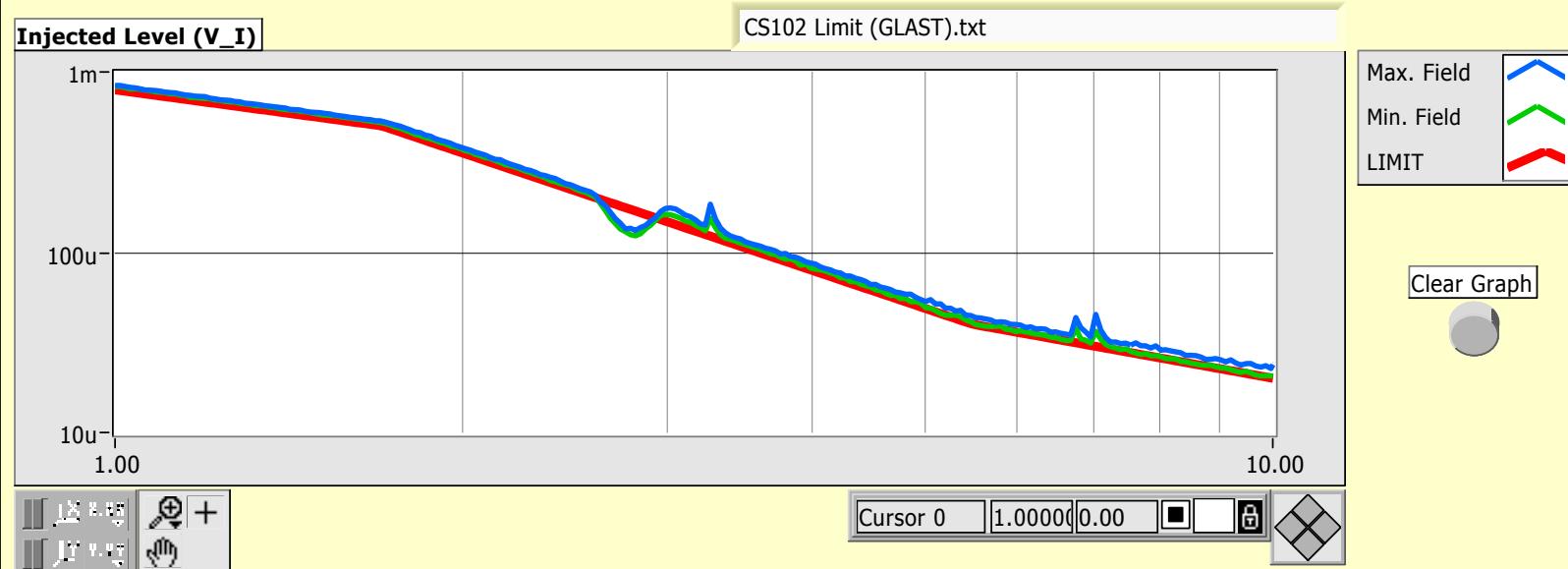
CS01/02 +28 VDC Lead

GLAST (FM107) in Combined Data Collect/Register Read Mode

Plot_023

Test Equipment	Setup	Monitor	Control	SWEEP RATES
Volt(Amp) Monitor E4440	From (MHz) 1.000000 To (MHz) 10.000000 Rate 0.0100 Sweep Up Dwell (sec) 3.0	Injected Level (V_I rms) 22.040u Frequency (MHz) 10.000000 26.86 dB μ Out of Tol Max Input -41.76 dBm SigGen Meter -80 -60 -40 -20 0 20 -47.46 dBm	Freq. Scan Paused RF OFF STOP	MIL-STD-461D 30 Hz - 1 MHz 0.01 1 MHz-30 MHz 0.005 30 MHz-1 GHz 0.0025 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005
SigGen Model HP8643A RF Port	Setpoint (V_I rms) from File 19.953u			MIL-STD-461E 30 Hz - 1 MHz 0.05 1 MHz-30 MHz 0.01 30 MHz-1 GHz 0.005 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005
Amplifier None	Bypass	26.0 dB μ		

CP-SINGER 91550-1b sn996 (11_18_04).txt



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10:20

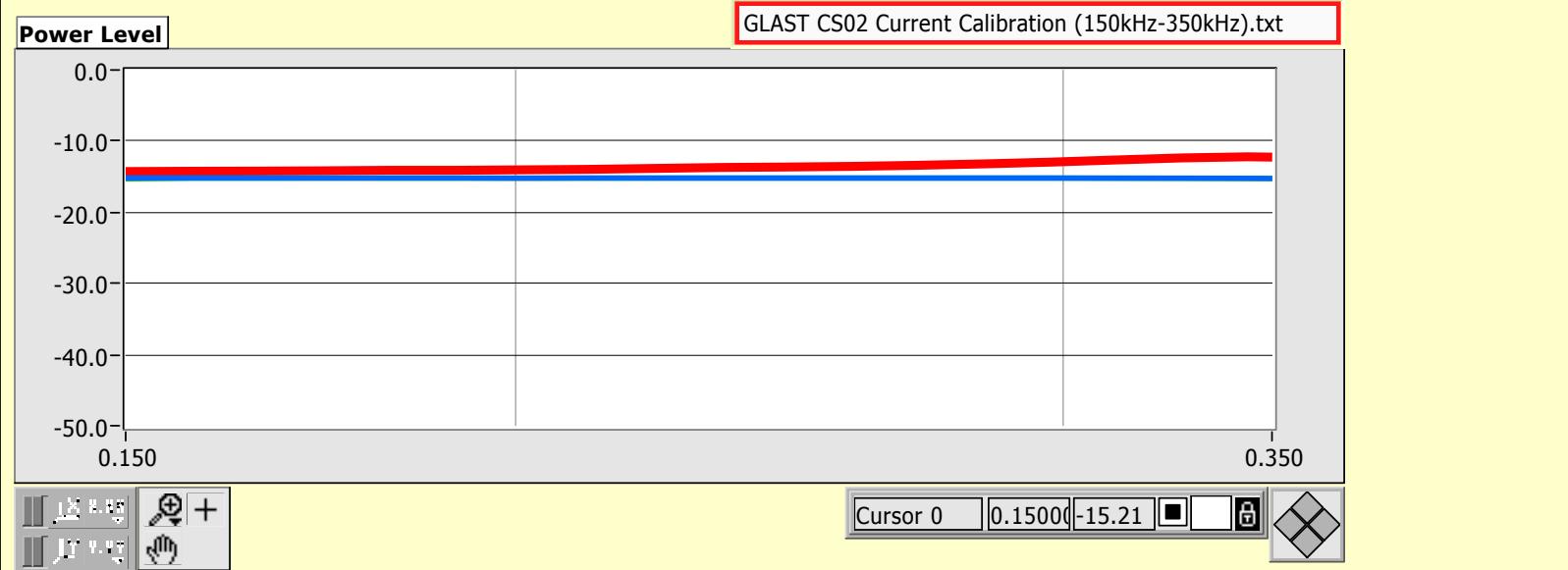
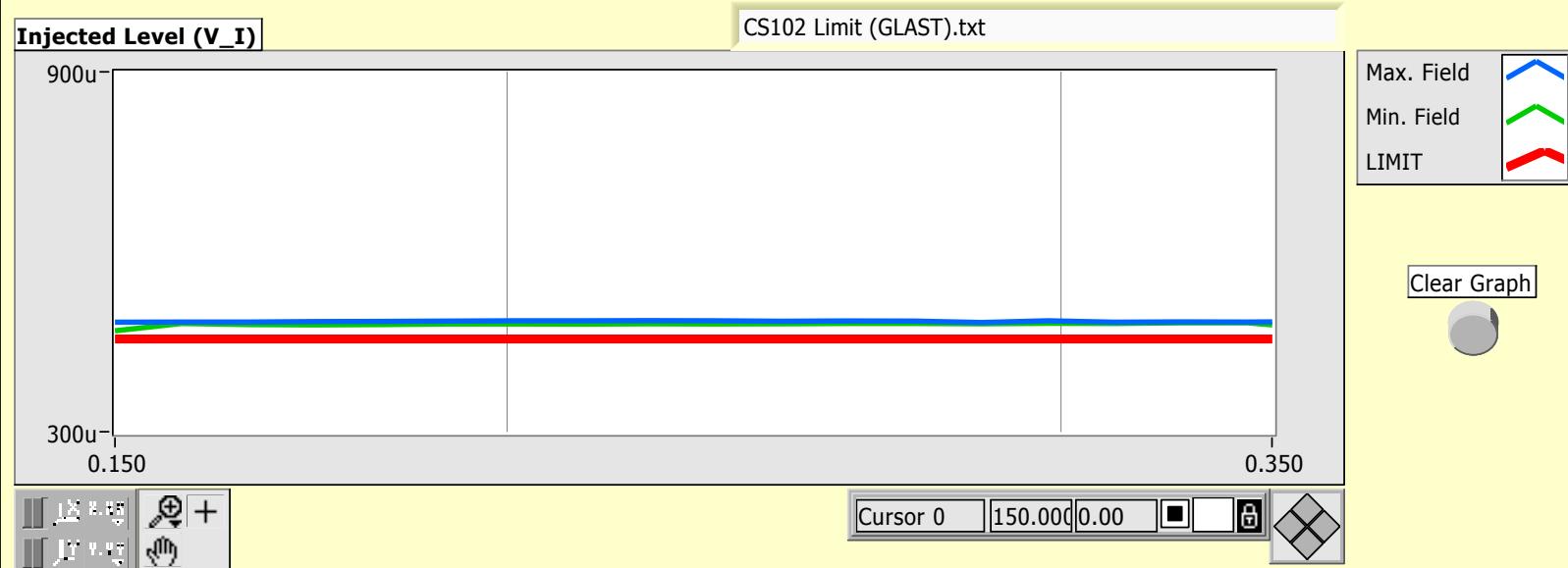
CS01/02 RETURN Lead

GLAST (FM107) in Combined Data Collect/Register Read Mode

Plot_024

Test Equipment	Setup	Monitor	Control	SWEEP RATES
Volt(Amp) Monitor E4440	From (MHz) 0.150000 To (MHz) 0.350000 Sweep Rate 0.0500 Dwell (sec) 3.0 Up	Injected Level (V_I rms) 415.537u Frequency (MHz) 0.350000 52.37 dB μ Out of Tol Max Input -12.27 dBm SigGen Meter -60 -40 -20 0 20 -80 -15.26 dBm	Freq. Scan Paused RF OFF STOP	MIL-STD-461D 30 Hz - 1 MHz 0.01 1 MHz-30 MHz 0.005 30 MHz-1 GHz 0.0025 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005
SigGen Model HP8643A Audio	Setpoint (V_I rms) from File 398.107u			MIL-STD-461E 30 Hz - 1 MHz 0.05 1 MHz-30 MHz 0.01 30 MHz-1 GHz 0.005 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005
Amplifier None	Bypass 52.0 dB μ			

CP-SINGER 91550-1b sn996 (11_18_04).txt



Tue, Dec 14, 2004

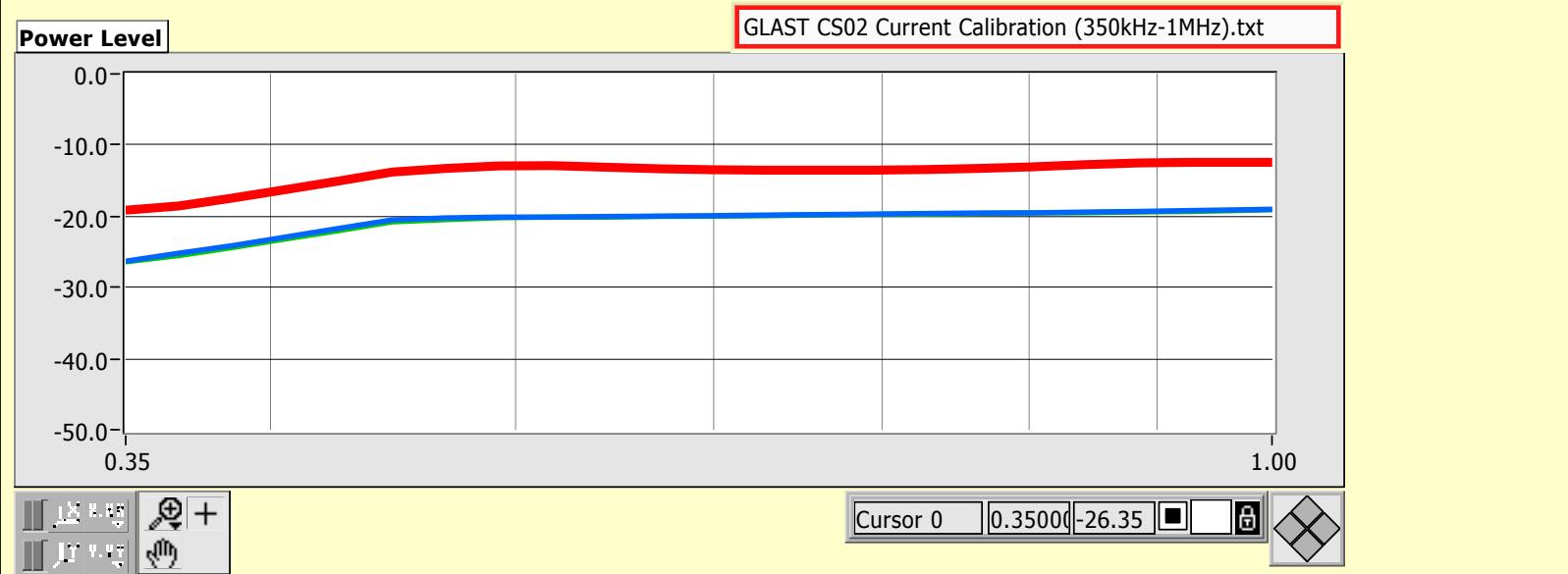
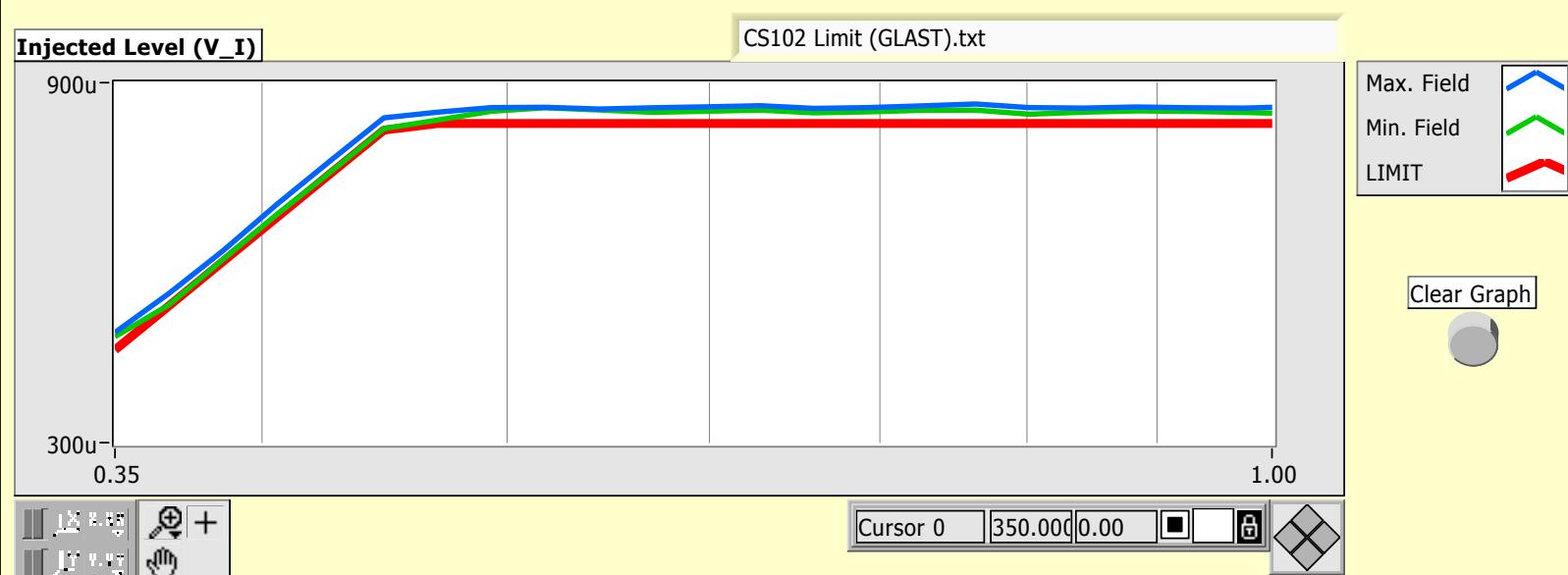
10:23

CS01/02 RETURN Lead GLAST (FM107) in Combined Data Collect/Register Read Mode

Plot_025

Test Equipment	Setup	Monitor	Control	SWEEP RATES
Volt(Amp) Monitor <input type="button" value="E4440"/> CH L1 Ave <input type="checkbox"/> SigGen Model <input type="button" value="HP8643A RF Port"/> Amplifier None	From (MHz) <input type="text" value="0.350000"/> To (MHz) <input type="text" value="1.000000"/> <input type="button" value="Up"/> <input type="button" value="Down"/> Rate <input type="text" value="0.0500"/> Sweep <input type="button" value="Up"/> <input type="button" value="Down"/> Dwell (sec) <input type="text" value="3.0"/> Setpoint (V_I rms) <input checked="" type="radio"/> from File <input type="text" value="794.328u"/> <input type="radio"/> Bypass <input style="width: 50px; height: 20px; border: 1px solid black; border-radius: 10px; padding: 2px; margin-left: 10px;" type="text" value="58.0"/>	Injected Level (V_I rms) <input type="text" value="834.832u"/> Frequency (MHz) <input type="text" value="1.000000"/> 58.43 dB μ <input type="radio"/> Out of Tol Max Input <input style="width: 50px; height: 20px; border: 1px solid black; border-radius: 10px; padding: 2px; margin-left: 10px;" type="text" value="-12.45"/> SigGen Meter  <input style="width: 50px; height: 20px; border: 1px solid black; border-radius: 10px; padding: 2px; margin-left: 10px;" type="text" value="-19.03"/>	<input type="radio"/> Freq. Scan <input type="radio"/> Paused <input type="radio"/> RF <input type="radio"/> OFF <input style="background-color: red; color: white; width: 100px; height: 50px; border: none; border-radius: 50%;" type="button" value="STOP"/>	MIL-STD-461D 30 Hz - 1 MHz 0.01 1 MHz-30 MHz 0.005 30 MHz-1 GHz 0.0025 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005
				MIL-STD-461E 30 Hz - 1 MHz 0.05 1 MHz-30 MHz 0.01 30 MHz-1 GHz 0.005 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005

CP-SINGER 91550-1b sn996 (11_18_04).txt



Tue, Dec 14, 2004

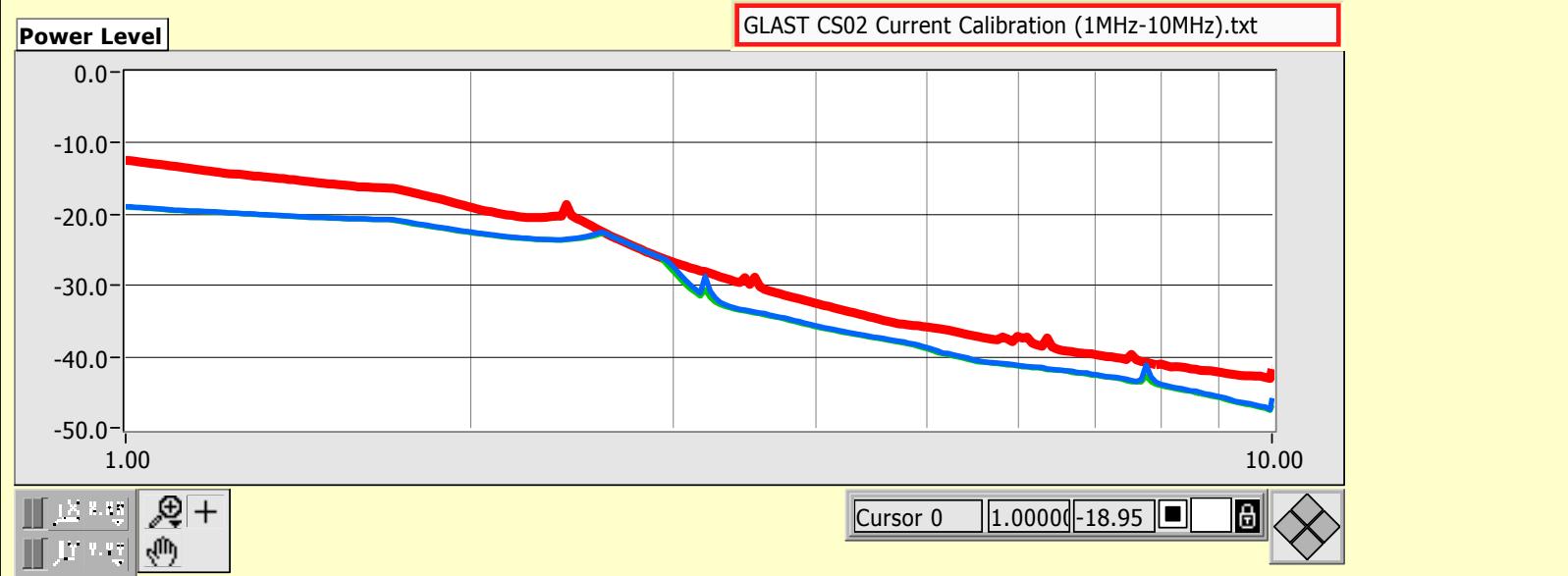
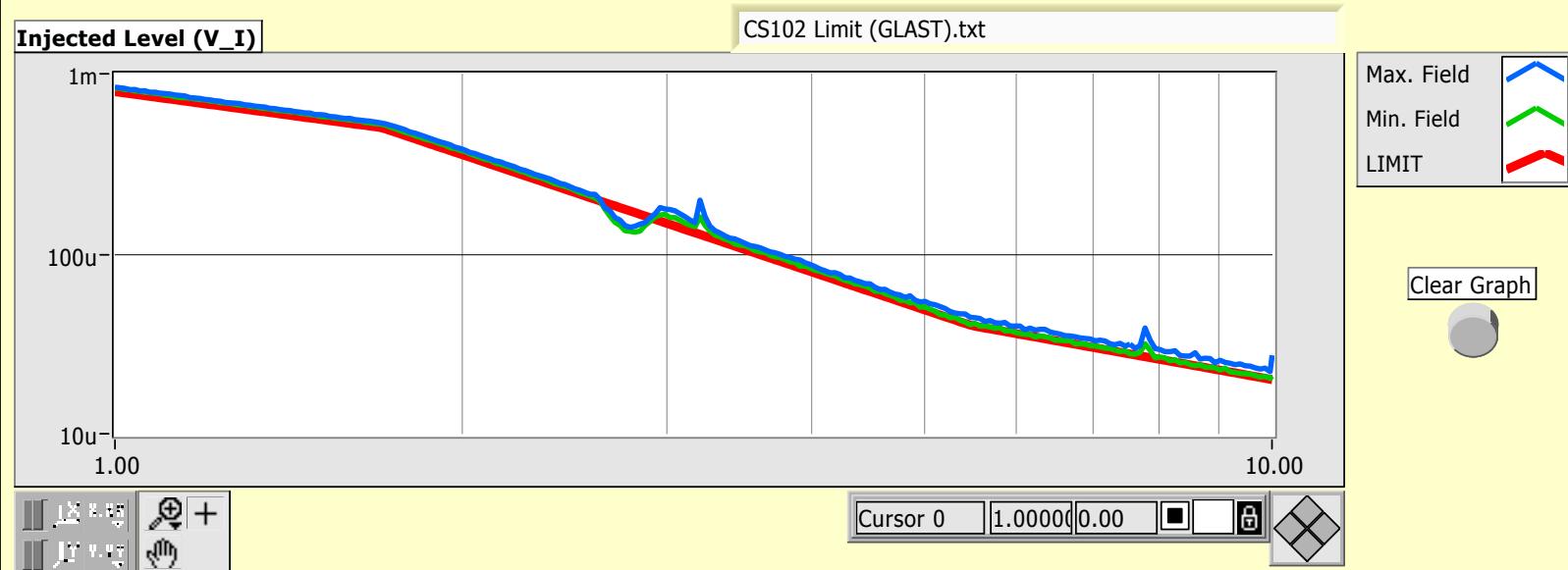
10:26

CS01/02 RETURN Lead GLAST (FM107) in Combined Data Collect/Register Read Mode

Plot_026

Test Equipment	Setup	Monitor	Control	SWEEP RATES
Volt(Amp) Monitor E4440	From (MHz) 1.000000 To (MHz) 10.000000 Sweep Rate 0.0100 dB/ μ s Dwell (sec) 3.0 Up	Injected Level (V_I rms) 22.920 μ A Frequency (MHz) 10.000000 27.20 dB/ μ Out of Tol Max Input -41.76 dBm SigGen Meter -60 -40 -20 0 20 -80 -46.83 dBm	Freq. Scan Paused RF OFF STOP	MIL-STD-461D 30 Hz - 1 MHz 0.01 1 MHz-30 MHz 0.005 30 MHz-1 GHz 0.0025 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005
SigGen Model HP8643A RF Port	Setpoint (V_I rms) from File 19.953 μ A	Bypass 26.0 dB/ μ		MIL-STD-461E 30 Hz - 1 MHz 0.05 1 MHz-30 MHz 0.01 30 MHz-1 GHz 0.005 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005
Amplifier None				

CP-SINGER 91550-1b sn996 (11_18_04).txt



Appendix F – CS102 Test Data (FM108)

(Plot_001 to Plot_005, and
Plot_009 to Plot_016)

Main.vi
D:\tdg\LabVIEW VIs\CS01_RS01\CS01_RS01(11_22_04)\Main.vi
Last modified on 11/21/2004 at 22:26
Printed on 12/13/2004 at 14:39

Mon, Dec 13, 2004
14:32

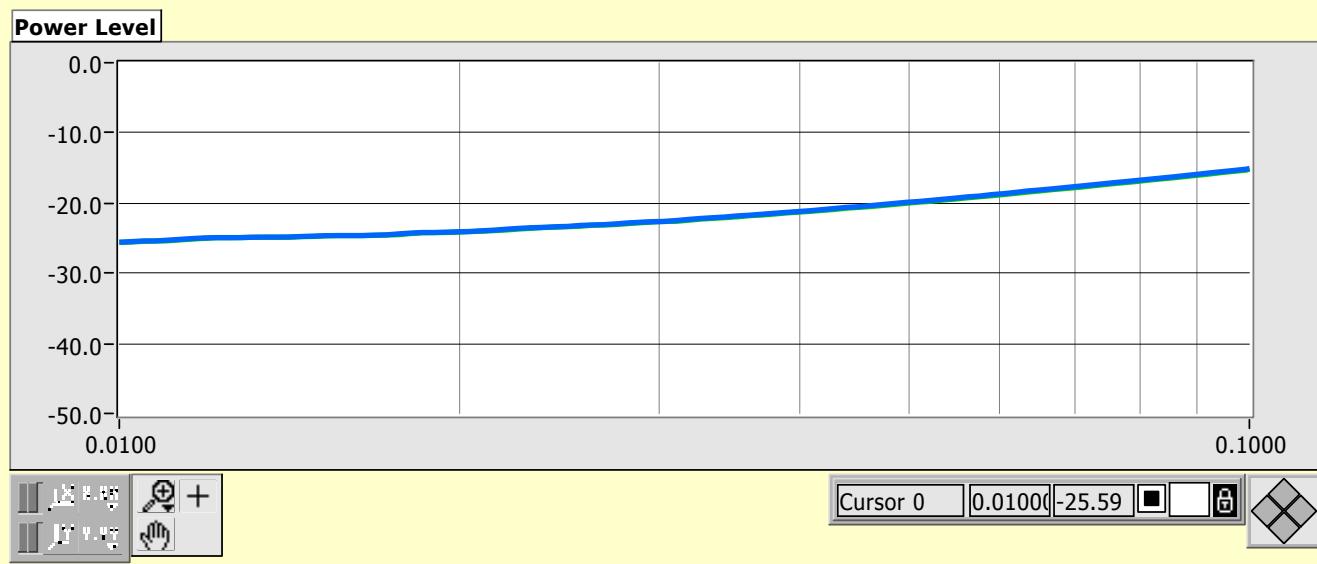
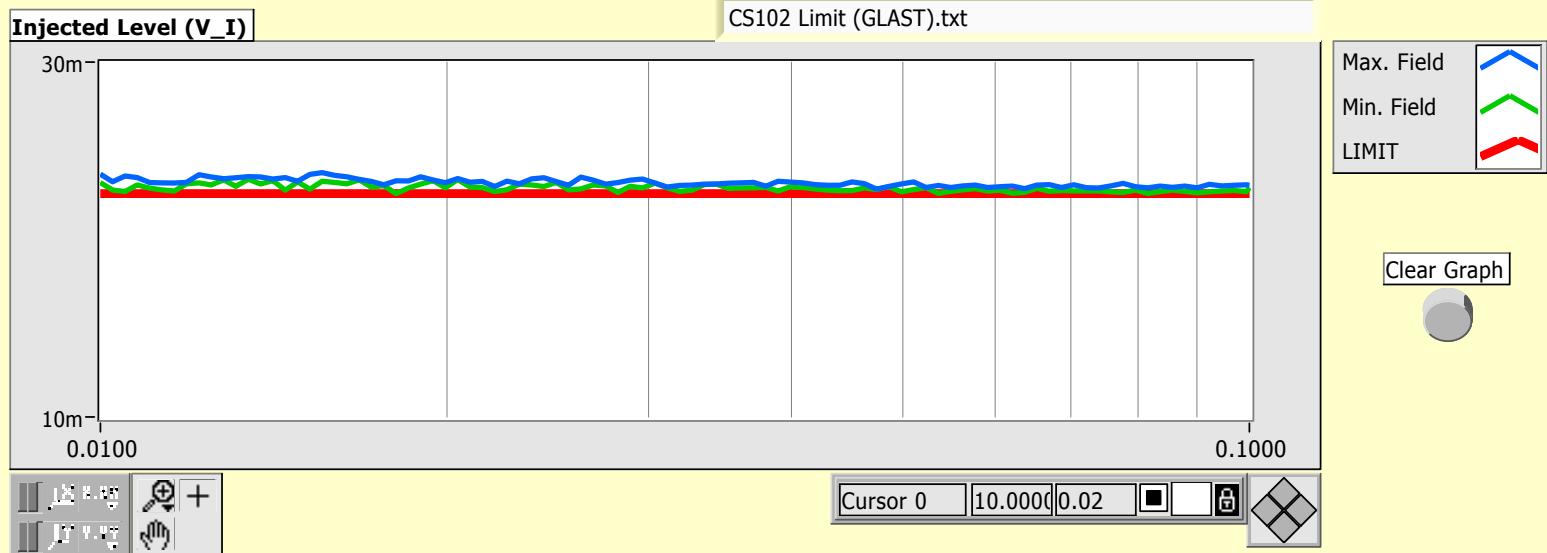
Test Equipment

- Volt(Amp) Monitor**: E4440
- CH**: L1 **Ave**:
- SigGen Model**: HP8643A Audio
- Amplifier**: McIntosh

CS01/02 **Plot_001**
GLAST Calibration

Setup		Monitor		Control	SWEEP RATES
From (MHz)	To (MHz)	Injected Level (V_I rms)	Frequency (MHz)	Freq. Scan	MIL-STD-461D
0.010000	0.100000	20.480m	0.100000	Paused	30 Hz - 1 MHz 0.01 1 MHz-30 MHz 0.005 30 MHz-1 GHz 0.0025 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005
0.0250	Rate	86.23 dB μ	Out of Tol	RF	
2.0	Dwell (sec)	Up		OFF	
Setpoint (V_I rms)		Max Input		MIL-STD-461E	
from File	19.953m	6.00	dBm	30 Hz - 1 MHz 0.05 1 MHz-30 MHz 0.01 30 MHz-1 GHz 0.005 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005	
Bypass	86.0 dB μ	SigGen Meter		STOP	
PWR Calibration		-80	-60 -40 -20 0 20		
		-15.08	dBm		

CP-SINGER 91550-1b sn996 (11_18_04).txt



Main.vi
D:\tdg\LabVIEW VIs\CS01_RS01\CS01_RS01(11_22_04)\Main.vi
Last modified on 11/21/2004 at 22:26
Printed on 12/13/2004 at 15:04

Mon, Dec 13, 2004
15:00

Test Equipment

Volt(Amp) Monitor
E4440
CH L1 Ave

SigGen Model
HP8643A RF Port

Amplifier
None

Setup
From (MHz) To (MHz)
0.350000 1.000000
0.0250 Rate Sweep Up
2.0 Dwell (sec)

Injected Level (V_I rms) Frequency (MHz)
833.007u 1.000000
58.41 dB μ Out of Tol

Setpoint (V_I rms)
from File 794.328u

Bypass 58.0 dB μ
PWR Calibration

Max Input
6.00 dBm

SigGen Meter
-60 -40 -20 0 20
-80 -12.44 dBm

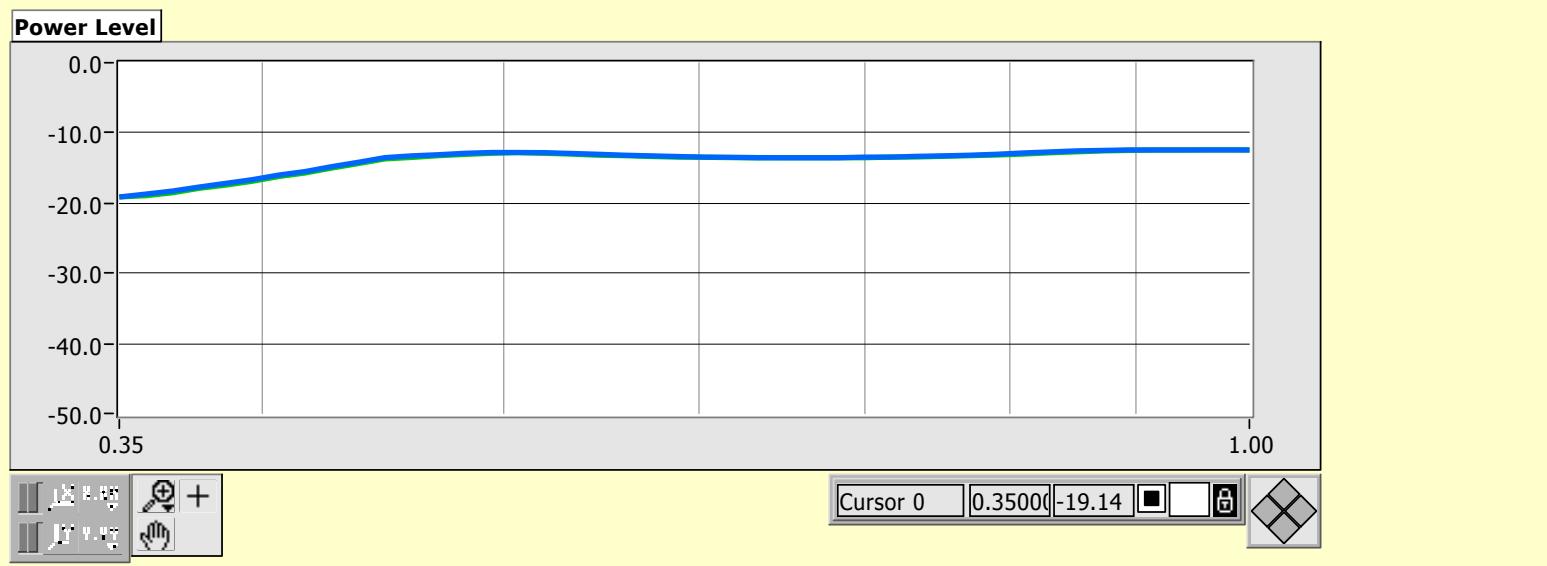
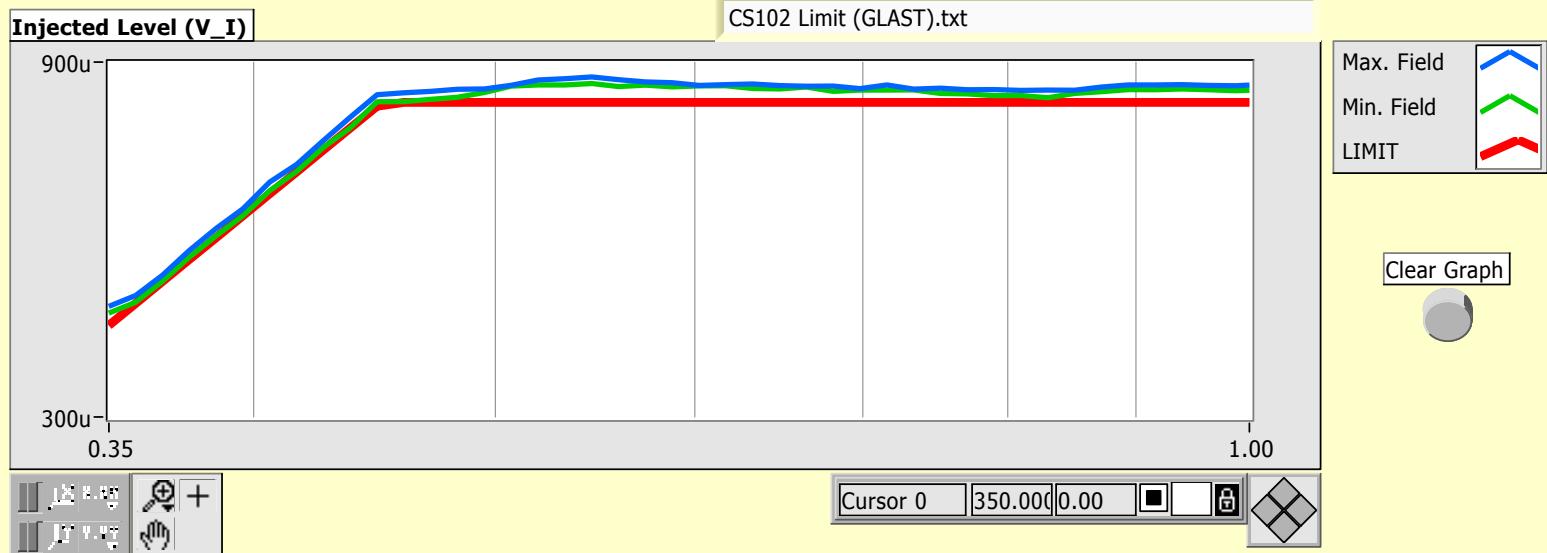
Control
Freq. Scan Paused
RF OFF

SWEEP RATES

MIL-STD-461D	MIL-STD-461E
30 Hz - 1 MHz 0.01	30 Hz - 1 MHz 0.05
1 MHz-30 MHz 0.005	1 MHz-30 MHz 0.01
30 MHz-1 GHz 0.0025	30 MHz-1 GHz 0.005
1 GHz - 8 GHz 0.001	1 GHz - 8 GHz 0.001
8 GHz -40 GHz 0.0005	8 GHz -40 GHz 0.0005

STOP

CP-SINGER 91550-1b sn996 (11_18_04).txt



Main.vi
D:\tdg\LabVIEW VIs\CS01_RS01\CS01_RS01(11_22_04)\Main.vi
Last modified on 11/21/2004 at 22:26
Printed on 12/13/2004 at 14:42

Mon, Dec 13, 2004
14:40

Test Equipment

Volt(Amp) Monitor
E4440
CH L1 Ave

SigGen Model
HP8643A Audio

Amplifier
None

CP-SINGER 91550-1b sn996 (11_18_04).txt

CS01/02 GLAST Calibration

Setup
From (MHz) To (MHz)
0.100000 0.150000
0.0250 Rate Sweep Up
2.0 Dwell (sec)

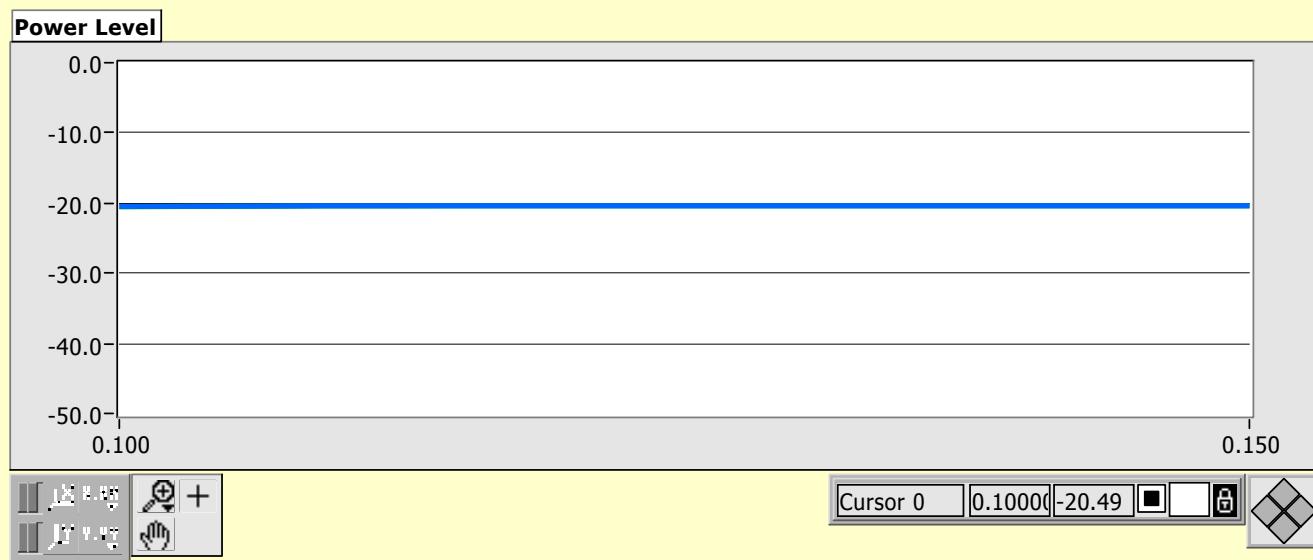
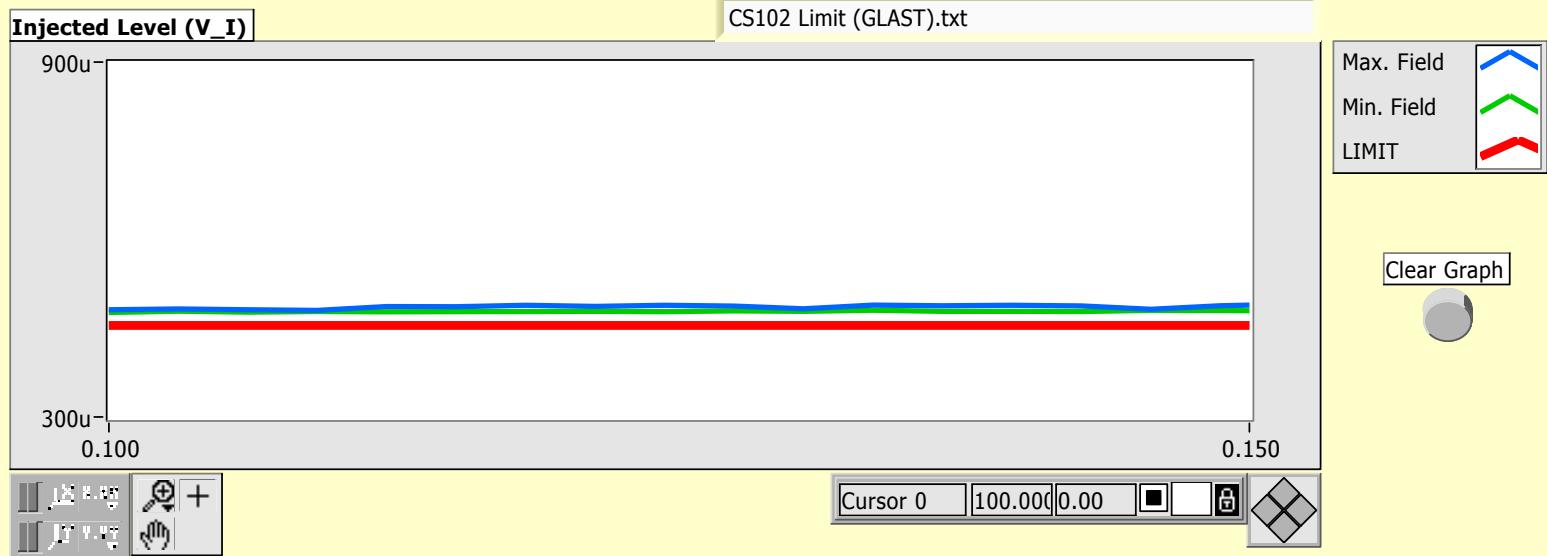
Monitor
Injected Level (V_I rms) Frequency (MHz)
418.160u 0.150000
52.43 dB μ Out of Tol
Max Input
SigGen Meter
Bypass 52.0 dB μ
PWR Calibration

Control
Freq. Scan Paused
RF OFF

SWEEP RATES

MIL-STD-461D	MIL-STD-461E
30 Hz - 1 MHz 0.01	30 Hz - 1 MHz 0.05
1 MHz-30 MHz 0.005	1 MHz-30 MHz 0.01
30 MHz-1 GHz 0.0025	30 MHz-1 GHz 0.005
1 GHz - 8 GHz 0.001	1 GHz - 8 GHz 0.001
8 GHz -40 GHz 0.0005	8 GHz -40 GHz 0.0005

STOP



Main.vi
D:\tdg\LabVIEW VIs\CS01_RS01\CS01_RS01(11_22_04)\Main.vi
Last modified on 11/21/2004 at 22:26
Printed on 12/13/2004 at 14:56

Mon, Dec 13, 2004
14:49

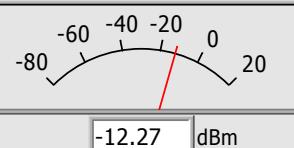
Test Equipment

Volt(Amp) Monitor
E4440
CH L1 Ave

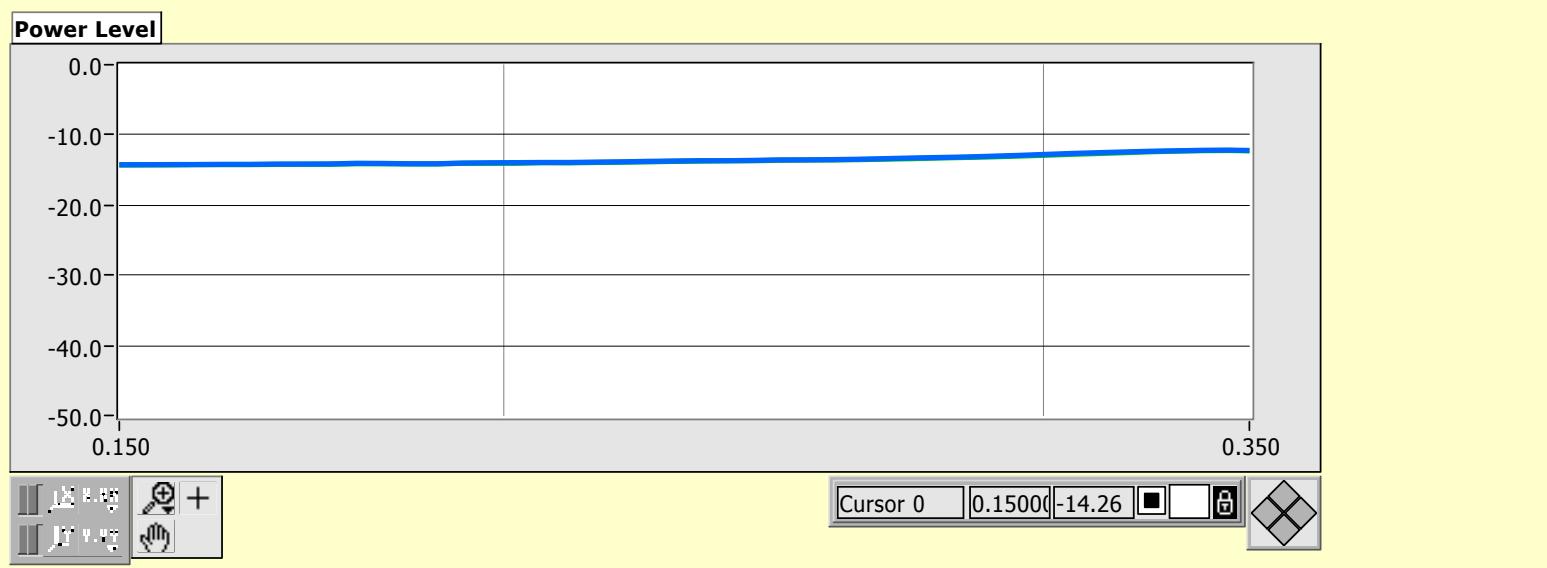
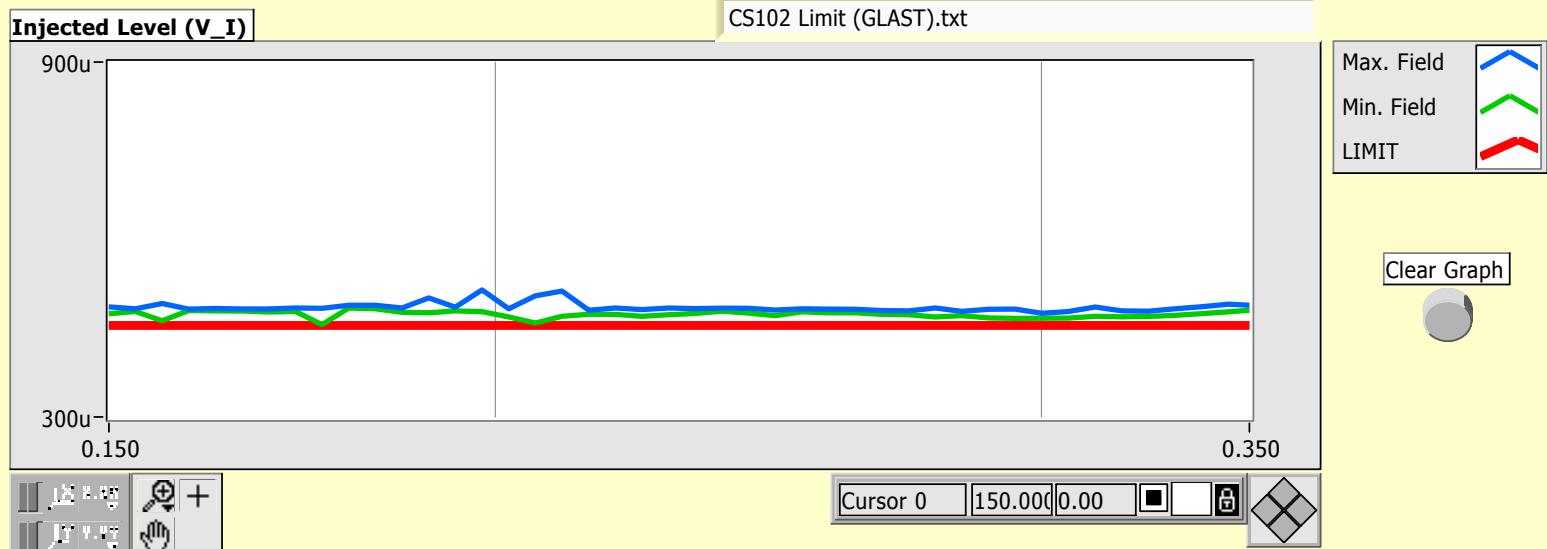
SigGen Model
HP8643A Audio

Amplifier
None

CS01/02 Plot_003
GLAST Calibration

Setup		Monitor		Control	SWEEP RATES
From (MHz)	To (MHz)	Injected Level (V_I rms)	Frequency (MHz)	Freq. Scan	MIL-STD-461D
0.150000	0.350000	417.359u	0.350000	Paused	30 Hz - 1 MHz 0.01 1 MHz-30 MHz 0.005 30 MHz-1 GHz 0.0025 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005
0.0200	Rate	52.41 dB μ	Out of Tol	RF	MIL-STD-461E
3.0	Dwell (sec)	Up	Max Input	OFF	30 Hz - 1 MHz 0.05 1 MHz-30 MHz 0.01 30 MHz-1 GHz 0.005 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005
Setpoint (V_I rms) from File 398.107u		SigGen Meter		STOP	
Bypass PWR Calibration					
		-80 -60 -40 -20 0 20 -12.27 dBm			

CP-SINGER 91550-1b sn996 (11_18_04).txt



Main.vi
D:\tdg\LabVIEW VIs\CS01_RS01\CS01_RS01(11_22_04)\Main.vi
Last modified on 11/21/2004 at 22:26
Printed on 12/13/2004 at 15:32

Mon, Dec 13, 2004
15:07

Test Equipment

Volt(Amp) Monitor
E4440
CH L1 Ave

SigGen Model
HP8643A RF Port

Amplifier
None

Setup
From (MHz) To (MHz)
1.000000 10.000000
0.0025 Rate Sweep Up
1.0 Dwell (sec)

Monitor
Injected Level (V_I rms) Frequency (MHz)
24.571u 10.000000
27.81 dB μ Out of Tol
Max Input
SigGen Meter
Bypass 26.0 dB μ
PWR Calibration

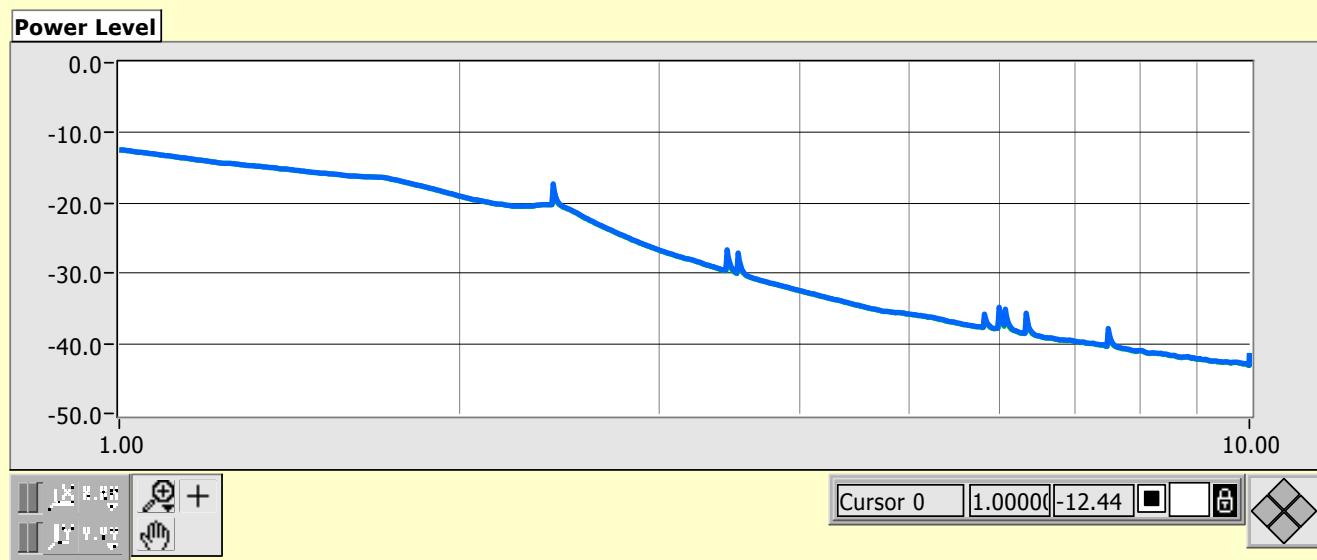
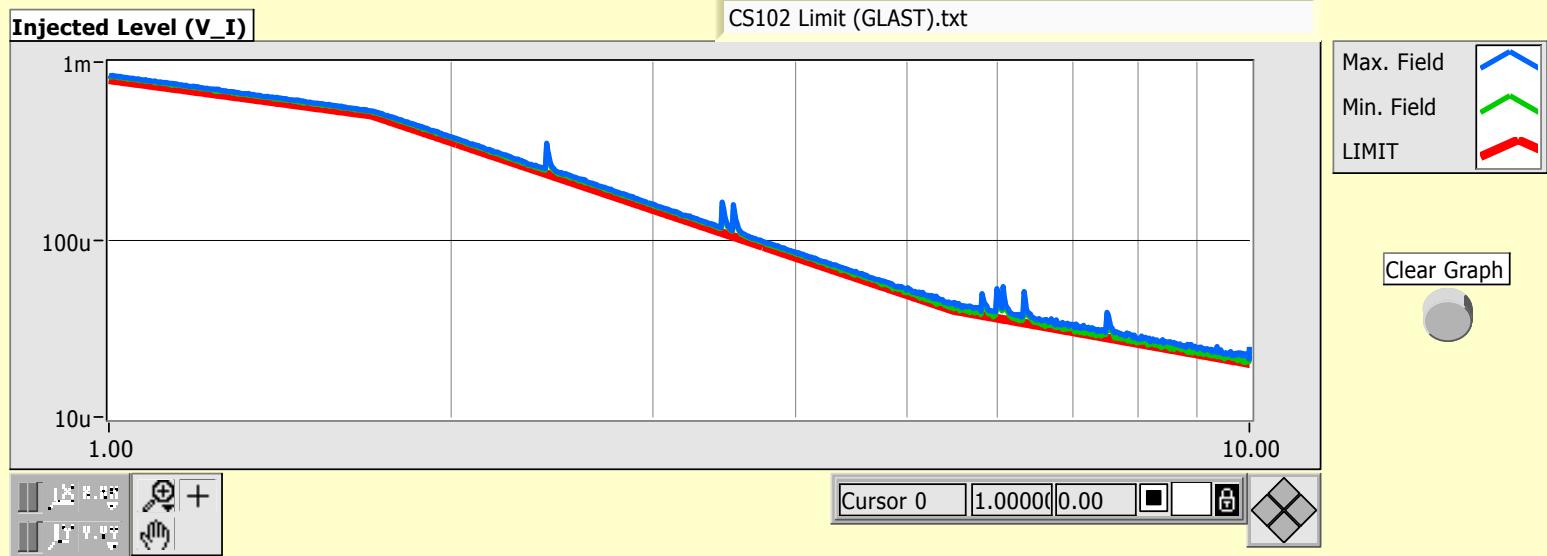
Control
Freq. Scan Paused
RF OFF

SWEEP RATES

MIL-STD-461D	MIL-STD-461E
30 Hz - 1 MHz 0.01	30 Hz - 1 MHz 0.05
1 MHz-30 MHz 0.005	1 MHz-30 MHz 0.01
30 MHz-1 GHz 0.0025	30 MHz-1 GHz 0.005
1 GHz - 8 GHz 0.001	1 GHz - 8 GHz 0.001
8 GHz -40 GHz 0.0005	8 GHz -40 GHz 0.0005

STOP

CP-SINGER 91550-1b sn996 (11_18_04).txt

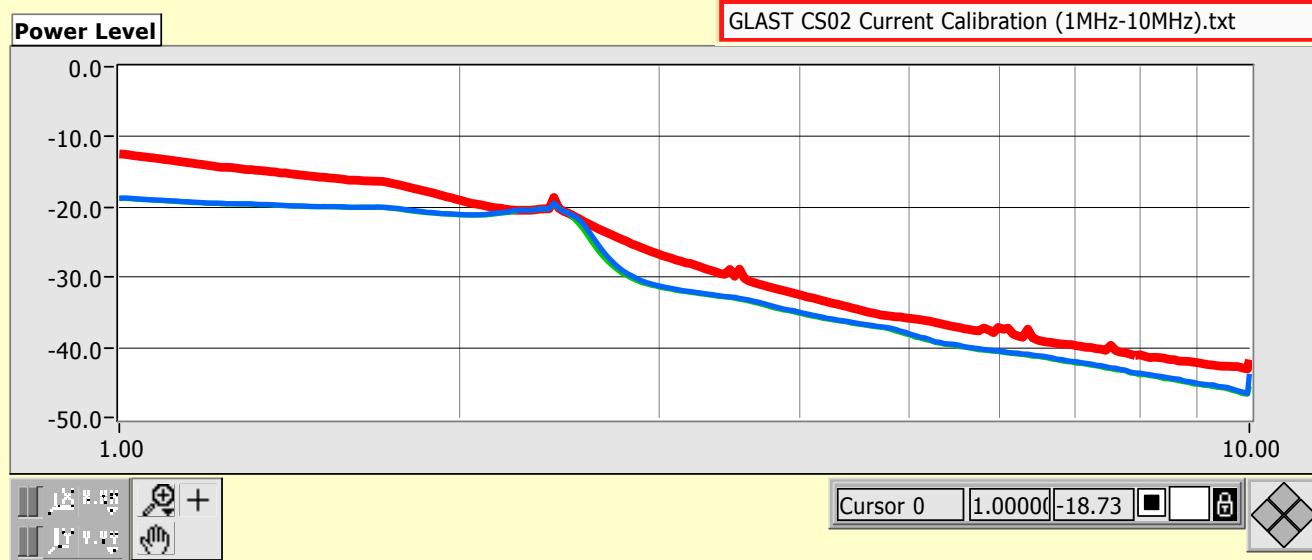
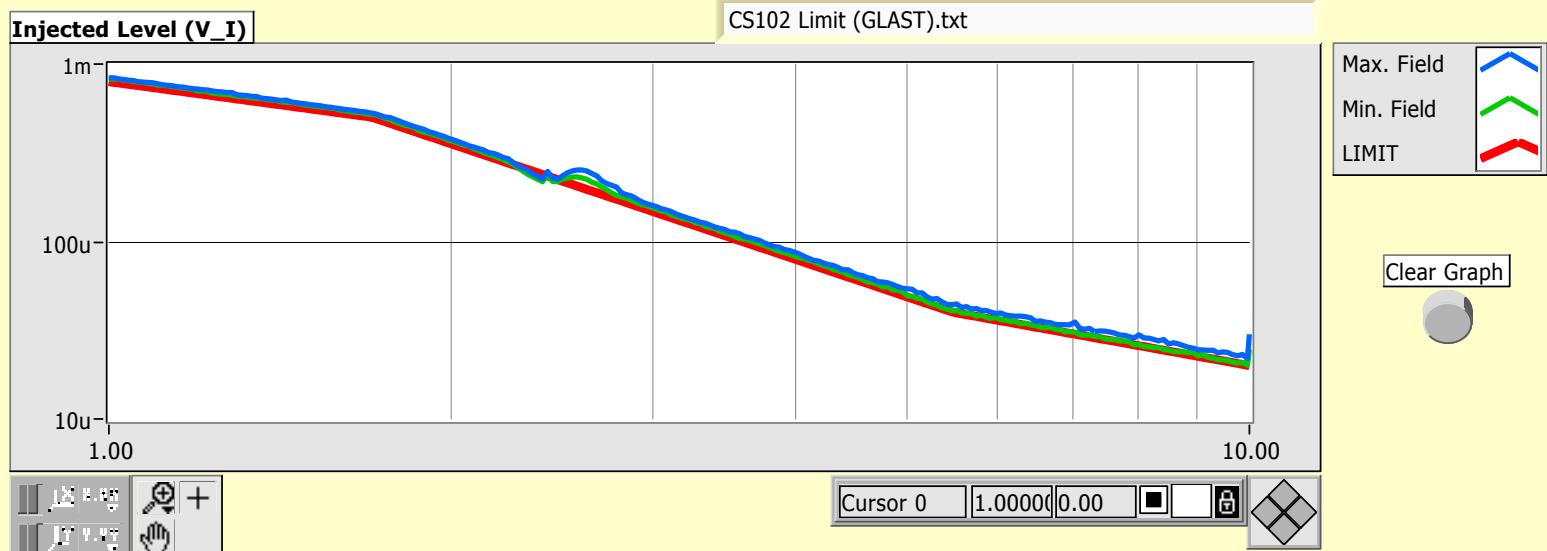


Main.vi
D:\tdg\LabVIEW VIs\CS01_RS01\CS01_RS01(11_22_04)\Main.vi
Last modified on 11/21/2004 at 22:26
Printed on 12/13/2004 at 16:56

Mon, Dec 13, 2004
16:40

CS01/02 +28 VDC Lead GLAST (FM108) in Combined Data Collect/Register Read Mode

Test Equipment		Setup	Monitor	Control	SWEEP RATES
Volt(Amp) Monitor E4440		From (MHz) 1.000000	To (MHz) 10.000000		MIL-STD-461D
CH L1	Ave <input type="checkbox"/>	0.0100 Rate	Sweep Up	Freq. Scan Paused	30 Hz - 1 MHz 0.01 1 MHz-30 MHz 0.005 30 MHz-1 GHz 0.0025 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005
		3.0 Dwell (sec)		RF OFF	
SigGen Model HP8643A RF Port		Setpoint (V_I rms) from File 19.953u	Max Input -41.76 dBm		MIL-STD-461E
Amplifier None		Bypass 26.0 dBμ	SigGen Meter -80 -60 -40 -20 0 20 -45.53 dBm	STOP	30 Hz - 1 MHz 0.05 1 MHz-30 MHz 0.01 30 MHz-1 GHz 0.005 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005
CP-SINGER 91550-1b sn996 (11_18_04).txt					

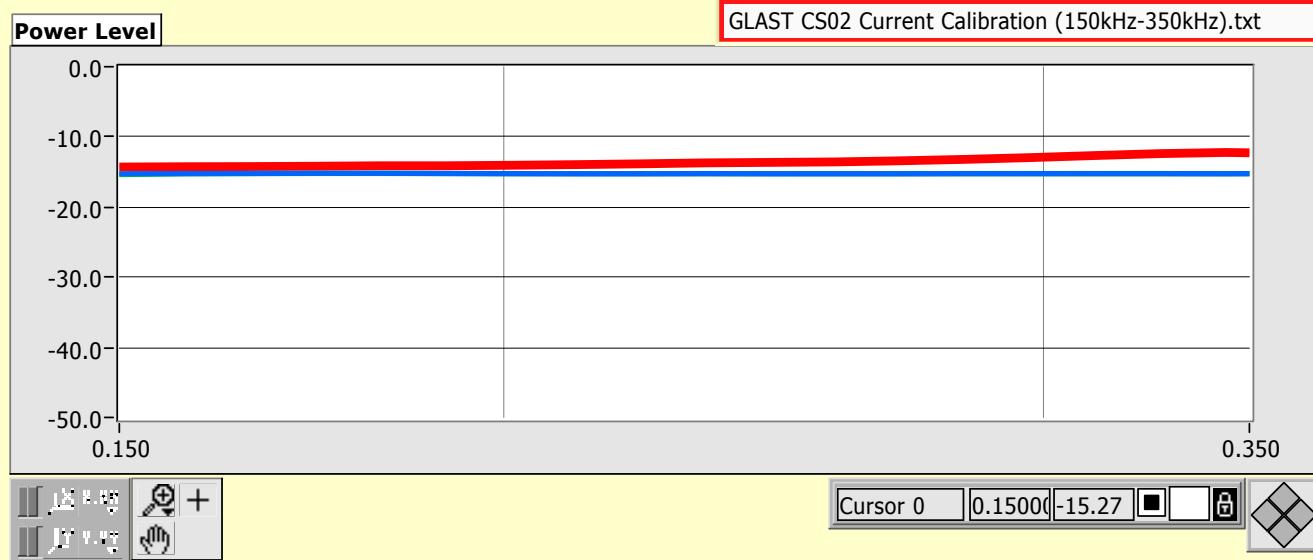
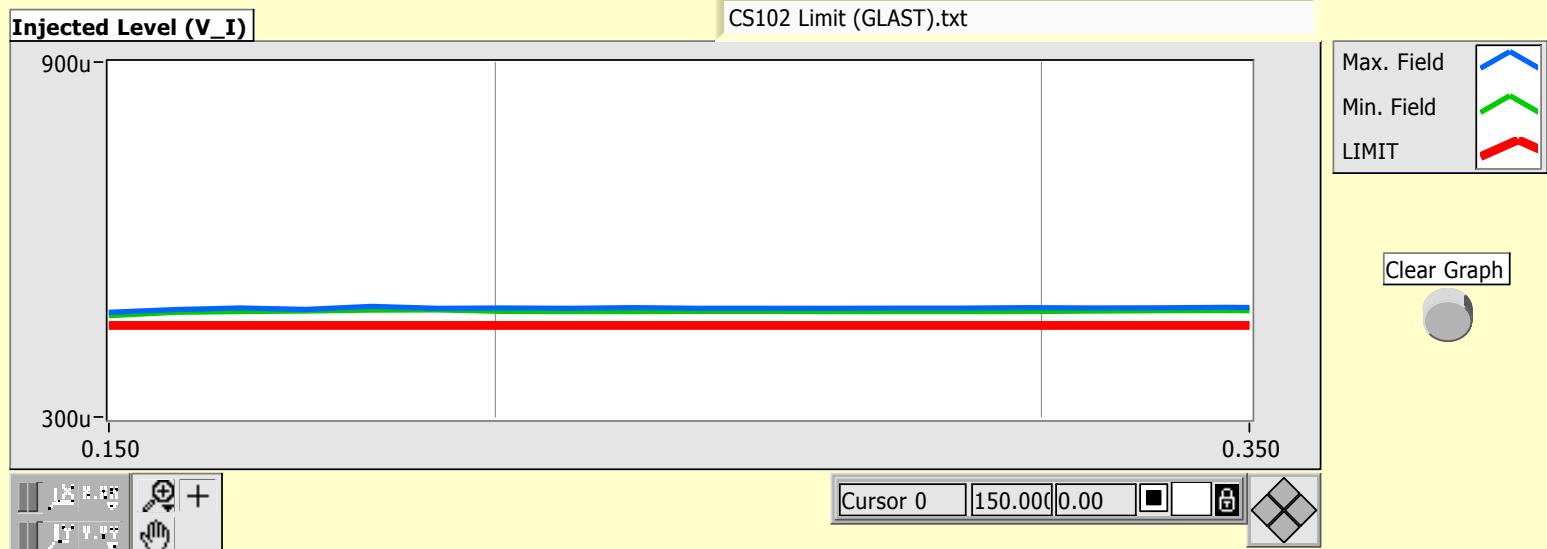


Main.vi
D:\tdg\LabVIEW VIs\CS01_RS01\CS01_RS01(11_22_04)\Main.vi
Last modified on 11/21/2004 at 22:26
Printed on 12/13/2004 at 17:08

Mon, Dec 13, 2004
17:06

CS01/02 RETURN Lead GLAST (FM108) in Combined Data Collect/Register Read Mode

Test Equipment		Setup	Monitor	Control	SWEEP RATES
Volt(Amp) Monitor E4440		From (MHz) 0.150000	To (MHz) 0.350000	Injected Level (V_I rms) 417.599u	MIL-STD-461D 30 Hz - 1 MHz 0.01 1 MHz-30 MHz 0.005 30 MHz-1 GHz 0.0025 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005
CH L1	Ave <input type="checkbox"/>	Rate 0.0500	Sweep Up	Frequency (MHz) 0.350000	
		Dwell (sec) 3.0		Max Input 52.42 dB μ	
		Setpoint (V_I rms) from File 398.107u		Out of Tol	
SigGen Model HP8643A Audio		Bypass	SigGen Meter -12.27 dBm		
Amplifier None		52.0 dB μ	-15.27 dBm	STOP	MIL-STD-461E 30 Hz - 1 MHz 0.05 1 MHz-30 MHz 0.01 30 MHz-1 GHz 0.005 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005
CP-SINGER 91550-1b sn996 (11_18_04).txt					



Main.vi
D:\tdg\LabVIEW VIs\CS01_RS01\CS01_RS01(11_22_04)\Main.vi
Last modified on 11/21/2004 at 22:26
Printed on 12/13/2004 at 17:12

Mon, Dec 13, 2004
17:09

Test Equipment

Volt(Amp) Monitor
E4440
CH L1 Ave

SigGen Model
HP8643A RF Port

Amplifier
None

Setup
From (MHz) To (MHz)
0.350000 1.000000
0.0500 Rate Sweep Up
3.0 Dwell (sec)

Monitor
Injected Level (V_I rms) Frequency (MHz)
825.751u 1.000000
58.34 dB μ Out of Tol
Max Input -12.45 dBm
SigGen Meter
-80 -60 -40 -20 0 20
-18.77 dBm

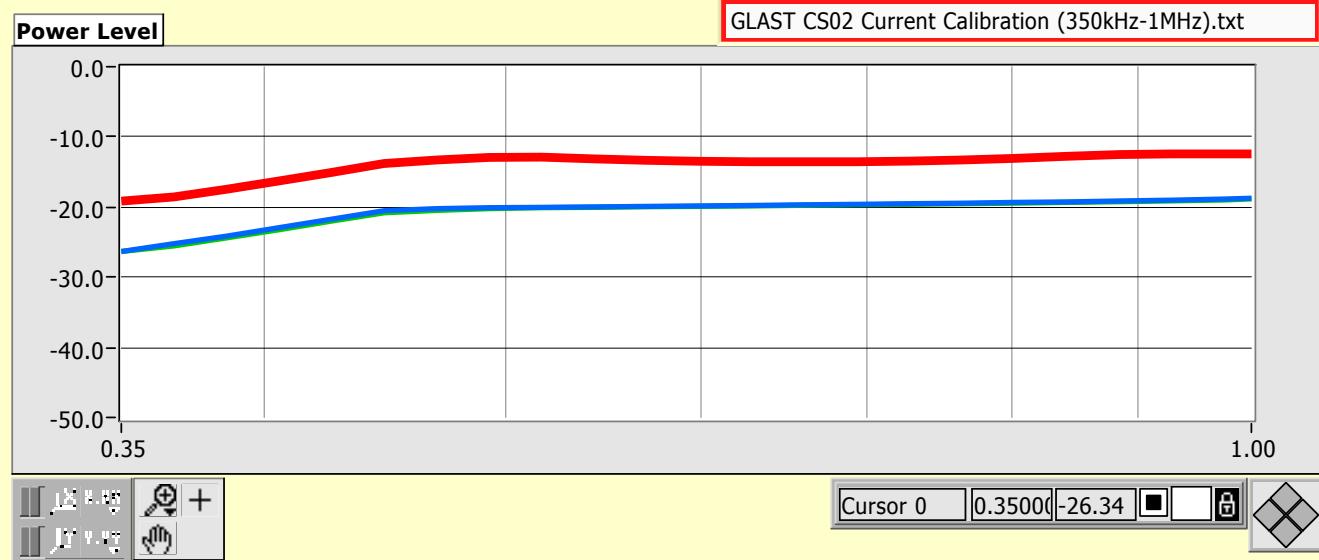
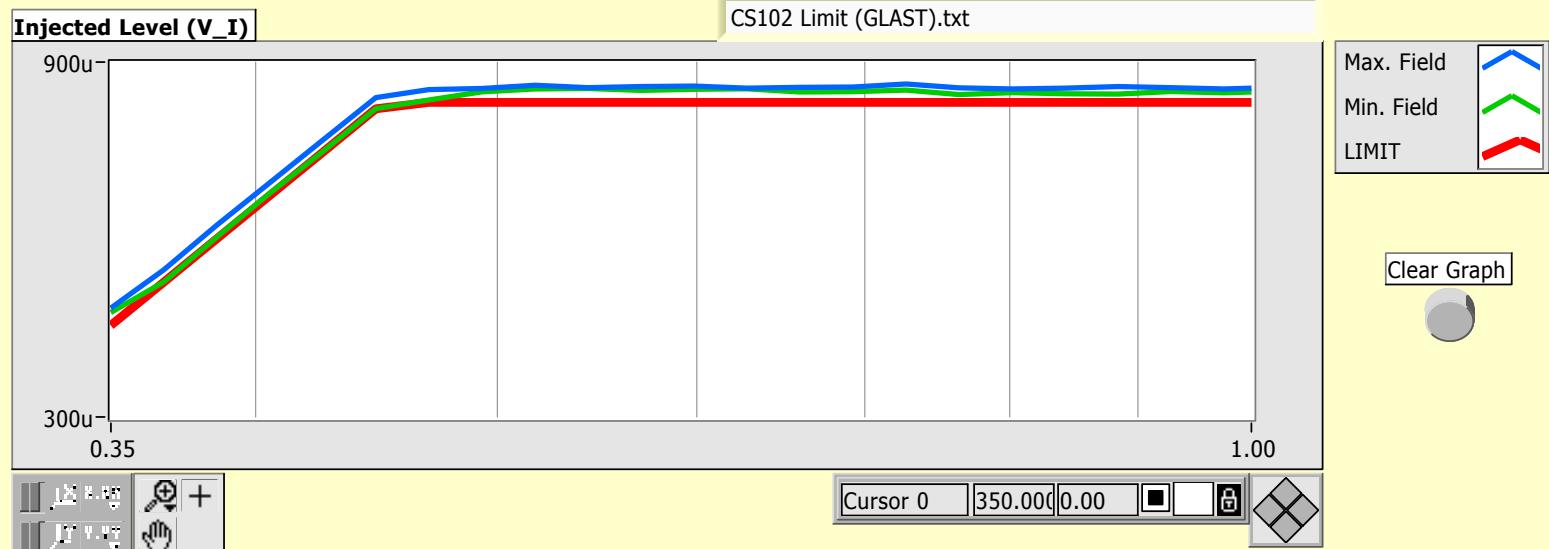
Control
Freq. Scan Paused
RF OFF

SWEEP RATES

MIL-STD-461D	MIL-STD-461E
30 Hz - 1 MHz 0.01	30 Hz - 1 MHz 0.05
1 MHz-30 MHz 0.005	1 MHz-30 MHz 0.01
30 MHz-1 GHz 0.0025	30 MHz-1 GHz 0.005
1 GHz - 8 GHz 0.001	1 GHz - 8 GHz 0.001
8 GHz -40 GHz 0.0005	8 GHz -40 GHz 0.0005

STOP

CP-SINGER 91550-1b sn996 (11_18_04).txt



Main.vi
D:\tdg\LabVIEW VIs\CS01_RS01\CS01_RS01(11_22_04)\Main.vi
Last modified on 11/21/2004 at 22:26
Printed on 12/13/2004 at 16:16

Mon, Dec 13, 2004
16:11

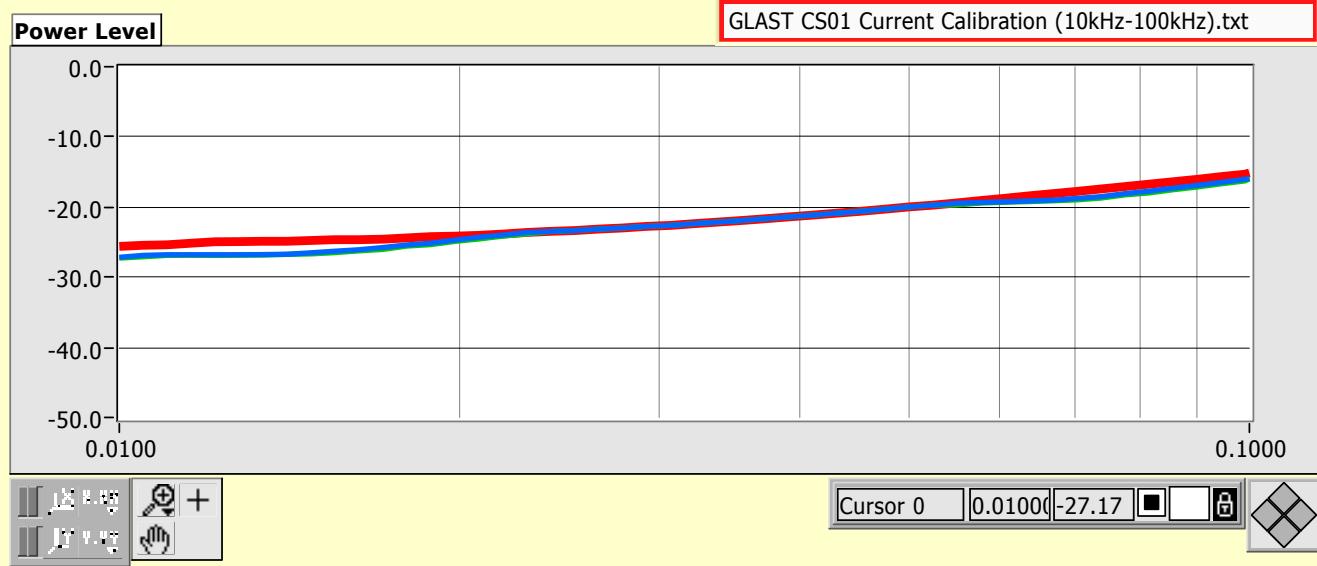
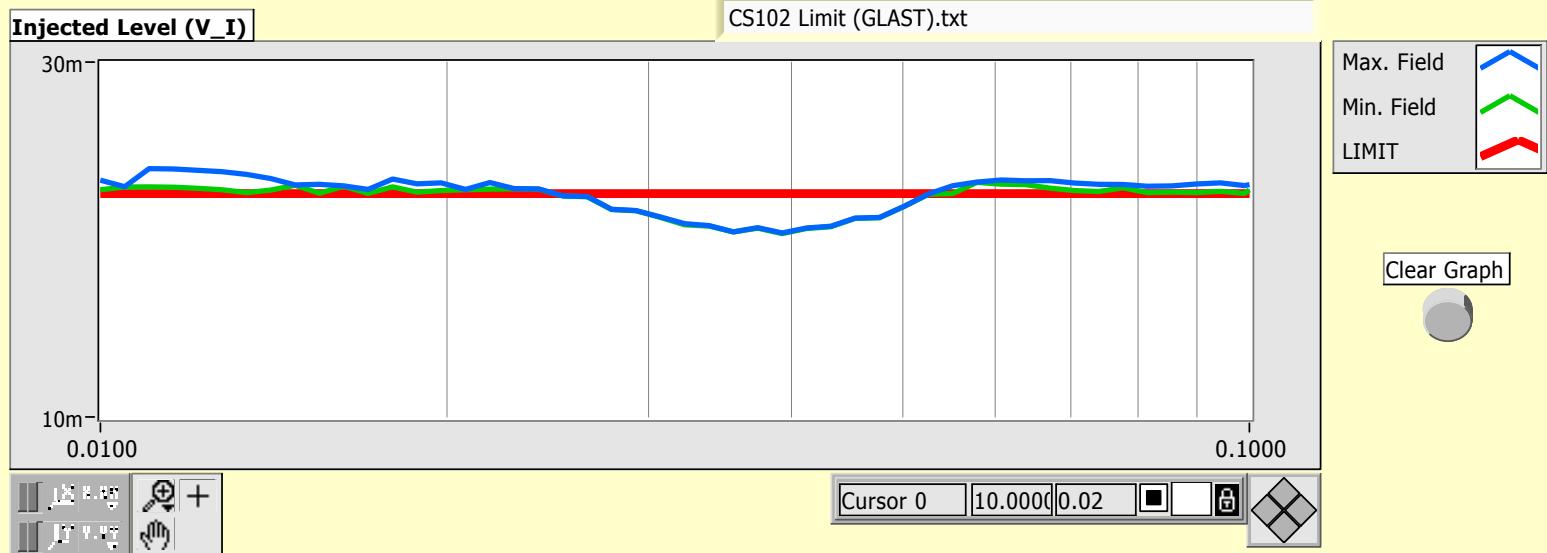
Test Equipment

- Volt(Amp) Monitor**: E4440
- SigGen Model**: HP8643A Audio
- Amplifier**: McIntosh

CS01/02
GLAST (FM108) in Combined Data Collect/Register Read Mode

Setup		Monitor		Control	SWEEP RATES
From (MHz)	To (MHz)	Injected Level (V_I rms)	Frequency (MHz)	Freq. Scan	MIL-STD-461D
0.010000	0.100000	20.520m	0.100000	Paused	30 Hz - 1 MHz 0.01 1 MHz-30 MHz 0.005 30 MHz-1 GHz 0.0025 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005
0.0500	Rate	86.24 dB μ	Out of Tol	RF	
3.0	Dwell (sec)	Up		OFF	
Setpoint (V_I rms)		Max Input		MIL-STD-461E	
from File	19.953m	-15.15	dBm	30 Hz - 1 MHz 0.05 1 MHz-30 MHz 0.01 30 MHz-1 GHz 0.005 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005	
Bypass	86.0 dB μ	SigGen Meter		STOP	
		-80	-60 -40 -20 0 20		
		-15.90 dBm			

CP-SINGER 91550-1b sn996 (11_18_04).txt



Main.vi
D:\tdg\LabVIEW VIs\CS01_RS01\CS01_RS01(11_22_04)\Main.vi
Last modified on 11/21/2004 at 22:26
Printed on 12/13/2004 at 16:19

Mon, Dec 13, 2004
16:18

Test Equipment

Volt(Amp) Monitor
E4440
CH L1 Ave

SigGen Model
HP8643A Audio

Amplifier
None

Setup
From (MHz) To (MHz)
0.100000 0.150000
0.0500 Rate Sweep
3.0 Dwell (sec) Up
Setpoint (V_I rms)
from File 398.107u
Bypass 52.0 dB μ

Monitor
Injected Level (V_I rms) Frequency (MHz)
410.906u 0.150000
52.27 dB μ Out of Tol
Max Input -20.41 dBm
SigGen Meter
-80 -60 -40 -20 0 20
-20.57 dBm

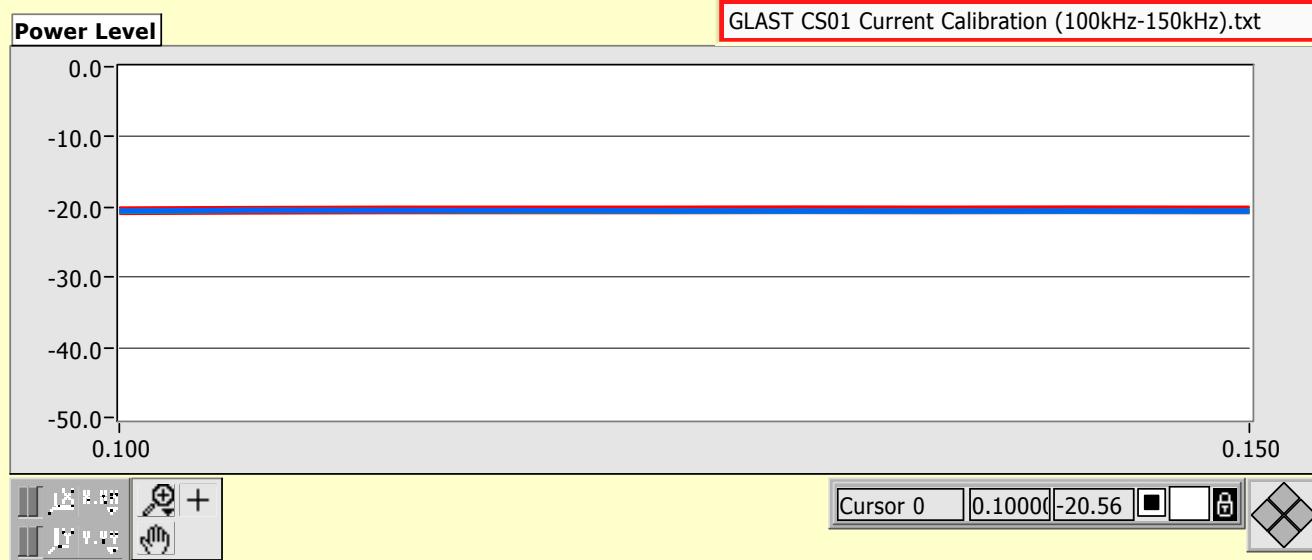
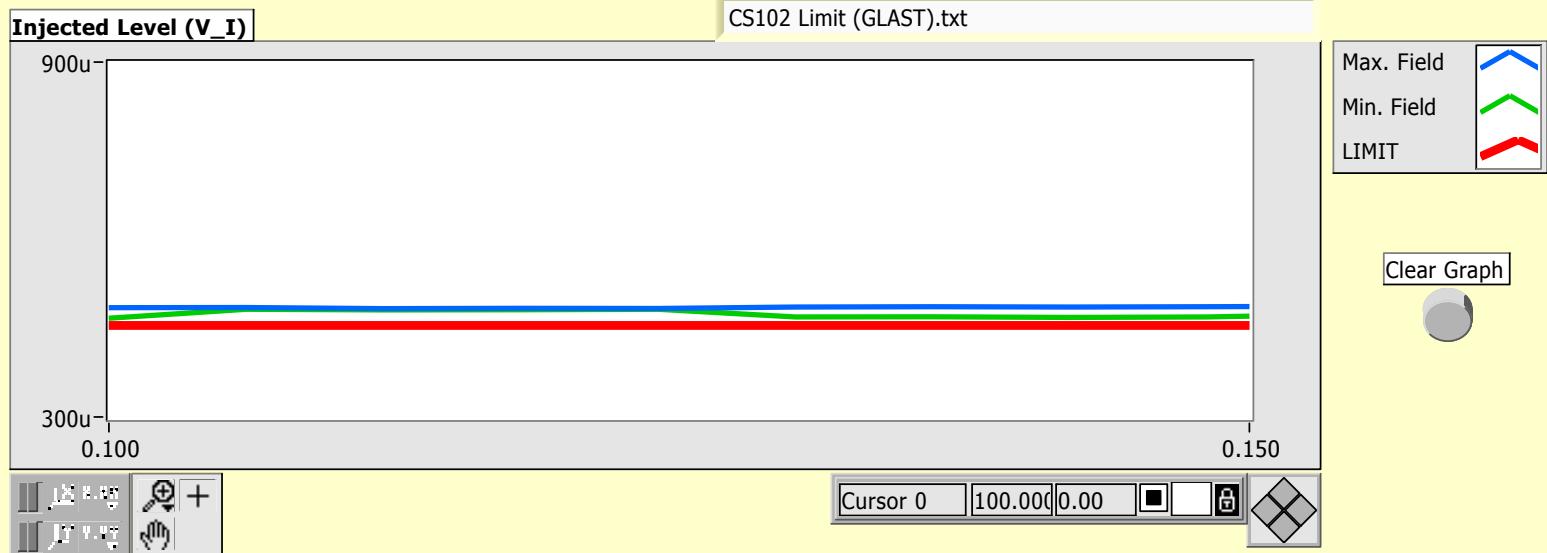
Control
Freq. Scan Paused
RF OFF

SWEEP RATES

MIL-STD-461D	MIL-STD-461E
30 Hz - 1 MHz 0.01	30 Hz - 1 MHz 0.05
1 MHz-30 MHz 0.005	1 MHz-30 MHz 0.01
30 MHz-1 GHz 0.0025	30 MHz-1 GHz 0.005
1 GHz - 8 GHz 0.001	1 GHz - 8 GHz 0.001
8 GHz -40 GHz 0.0005	8 GHz -40 GHz 0.0005

STOP

CP-SINGER 91550-1b sn996 (11_18_04).txt



Main.vi
D:\tdg\LabVIEW VIs\CS01_RS01\CS01_RS01(11_22_04)\Main.vi
Last modified on 11/21/2004 at 22:26
Printed on 12/13/2004 at 16:36

Mon, Dec 13, 2004
16:33

Test Equipment

Volt(Amp) Monitor
E4440
CH L1 Ave

SigGen Model
HP8643A Audio

Amplifier
None

Setup
From (MHz) To (MHz)
0.150000 0.350000
0.0500 Rate Sweep
3.0 Dwell (sec) Up
Setpoint (V_I rms)
from File 398.107u
Bypass 52.0 dB μ

Monitor
Injected Level (V_I rms) Frequency (MHz)
417.455u 0.350000
52.41 dB μ Out of Tol
Max Input -12.27 dBm
SigGen Meter
-80 -60 -40 -20 0 20
-15.27 dBm

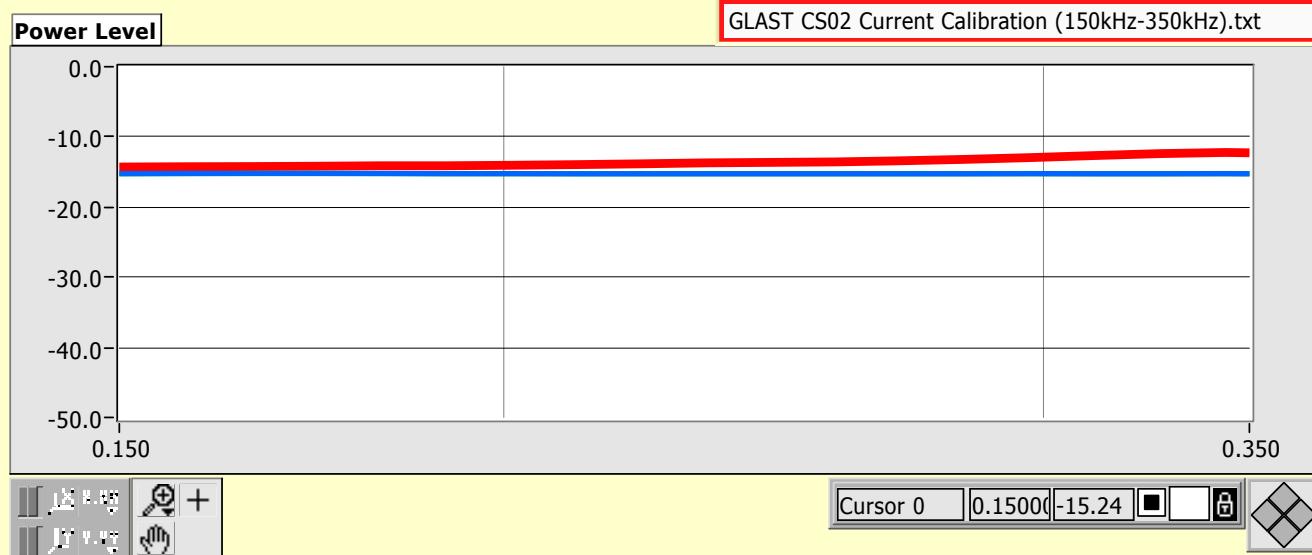
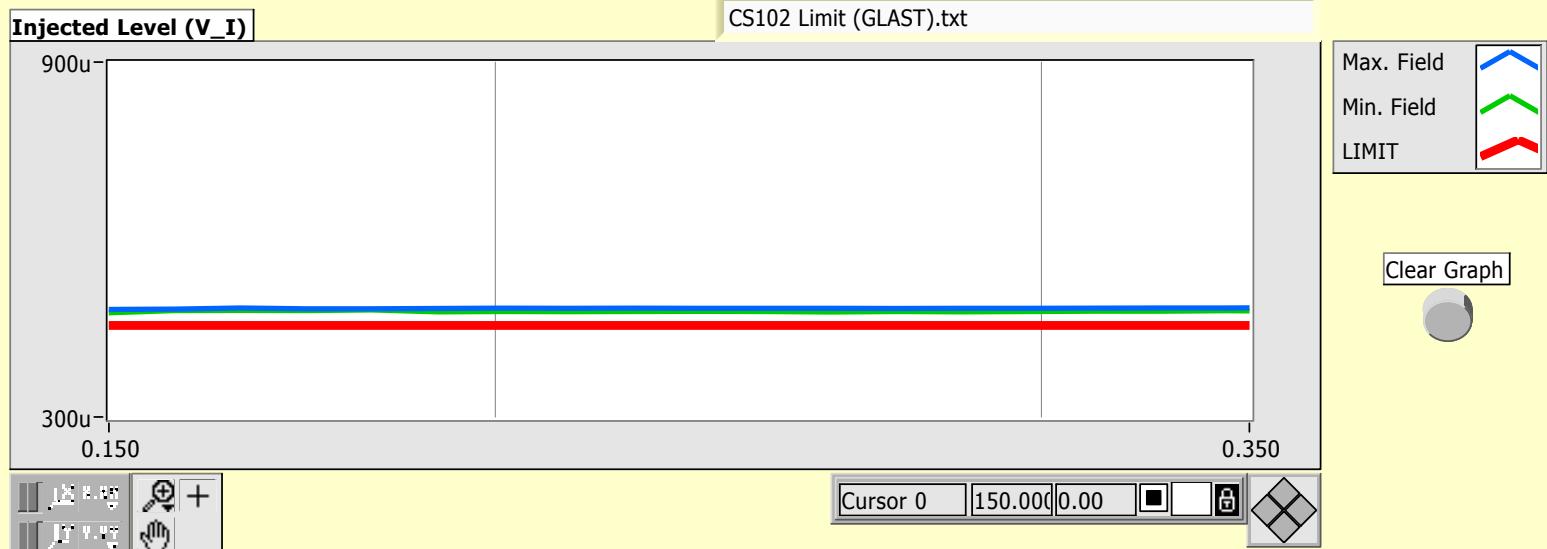
Control
Freq. Scan Paused
RF OFF

SWEEP RATES

MIL-STD-461D	MIL-STD-461E
30 Hz - 1 MHz 0.01	30 Hz - 1 MHz 0.05
1 MHz-30 MHz 0.005	1 MHz-30 MHz 0.01
30 MHz-1 GHz 0.0025	30 MHz-1 GHz 0.005
1 GHz - 8 GHz 0.001	1 GHz - 8 GHz 0.001
8 GHz -40 GHz 0.0005	8 GHz -40 GHz 0.0005

STOP

CP-SINGER 91550-1b sn996 (11_18_04).txt



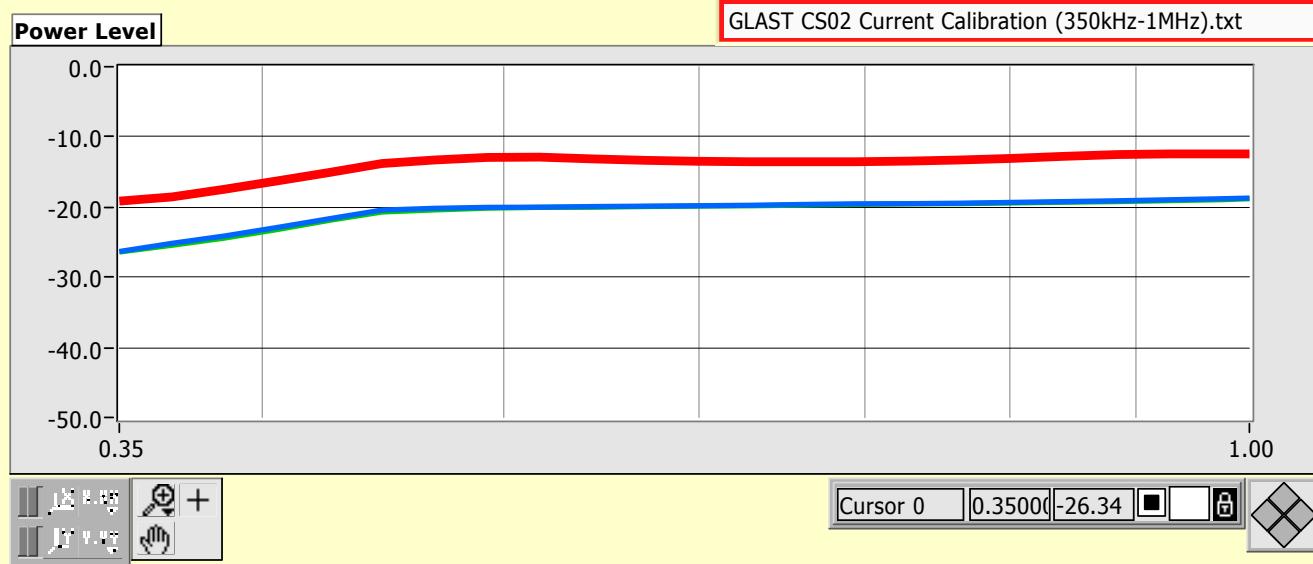
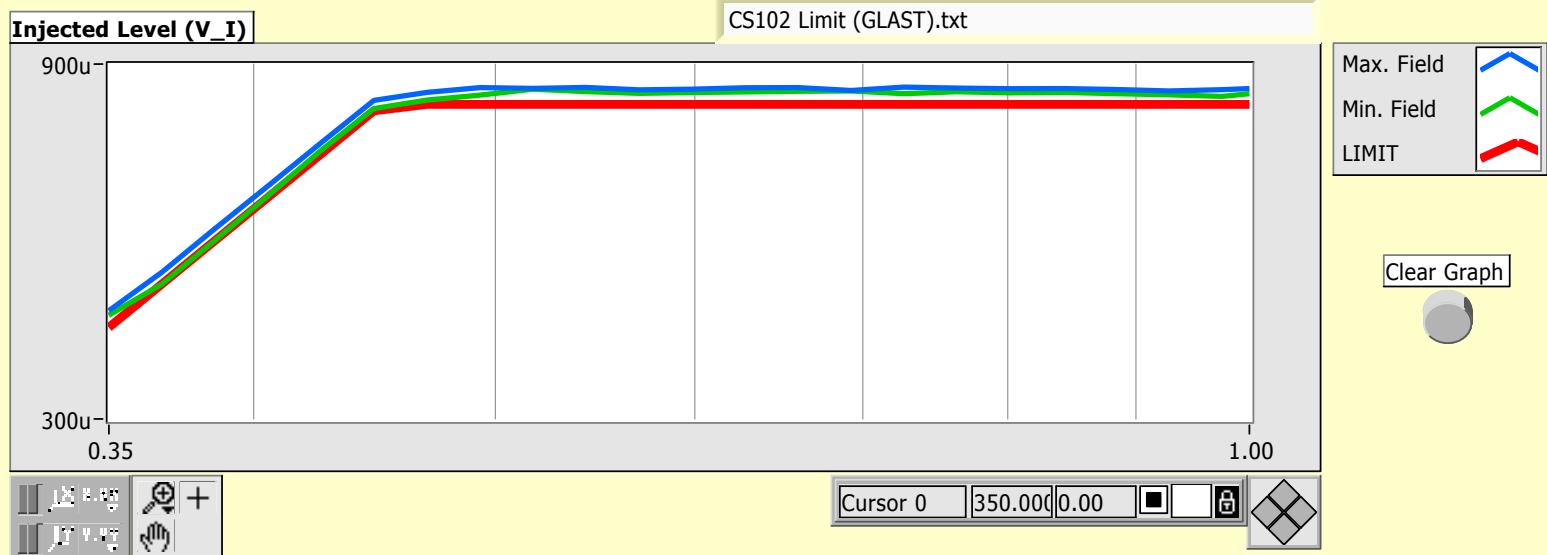
Main.vi
D:\tdg\LabVIEW VIs\CS01_RS01\CS01_RS01(11_22_04)\Main.vi
Last modified on 11/21/2004 at 22:26
Printed on 12/13/2004 at 16:40

Mon, Dec 13, 2004 16:37

CS01/02 +28 VDC Lead GLAST (FM108) in Combined Data Collect/Register Read Mode

Test Equipment	Setup	Monitor	Control	SWEEP RATES
Volt(Amp) Monitor E4440	From (MHz) 0.350000 To (MHz) 1.000000 Rate 0.0500 Dwell (sec) 3.0 Sweep Up	Injected Level (V_I rms) 832.912u Frequency (MHz) 1.000000 58.41 dB μ Out of Tol	Freq. Scan Paused RF OFF	MIL-STD-461D 30 Hz - 1 MHz 0.01 1 MHz-30 MHz 0.005 30 MHz-1 GHz 0.0025 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005
SigGen Model HP8643A RF Port	Setpoint (V_I rms) from File 794.328u	Max Input -12.45 dBm	MIL-STD-461E 30 Hz - 1 MHz 0.05 1 MHz-30 MHz 0.01 30 MHz-1 GHz 0.005 1 GHz - 8 GHz 0.001 8 GHz -40 GHz 0.0005	STOP
Amplifier None	Bypass 58.0 dB μ	SigGen Meter 		

CP-SINGER 91550-1b sn996 (11_18_04).txt



Main.vi
D:\tdg\LabVIEW VIs\CS01_RS01\CS01_RS01(11_22_04)\Main.vi
Last modified on 11/21/2004 at 22:26
Printed on 12/13/2004 at 17:27

Mon, Dec 13, 2004
17:12

Test Equipment

Volt(Amp) Monitor
E4440
CH L1 Ave

SigGen Model
HP8643A RF Port

Amplifier
None

Setup
From (MHz) To (MHz)
1.000000 10.000000
0.0100 Rate Sweep Up
3.0 Dwell (sec)

Monitor
Injected Level (V_I rms) Frequency (MHz)
20.757u 10.000000
26.34 dB μ Out of Tol
Max Input -41.76 dBm
SigGen Meter
-80 -60 -40 -20 0 20
-47.04 dBm

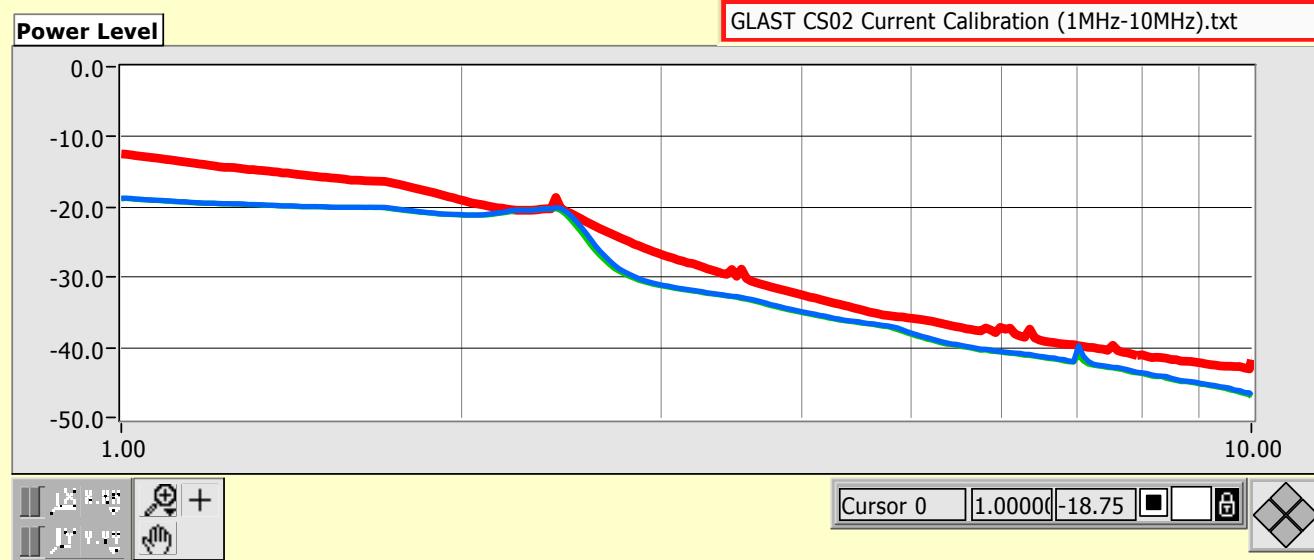
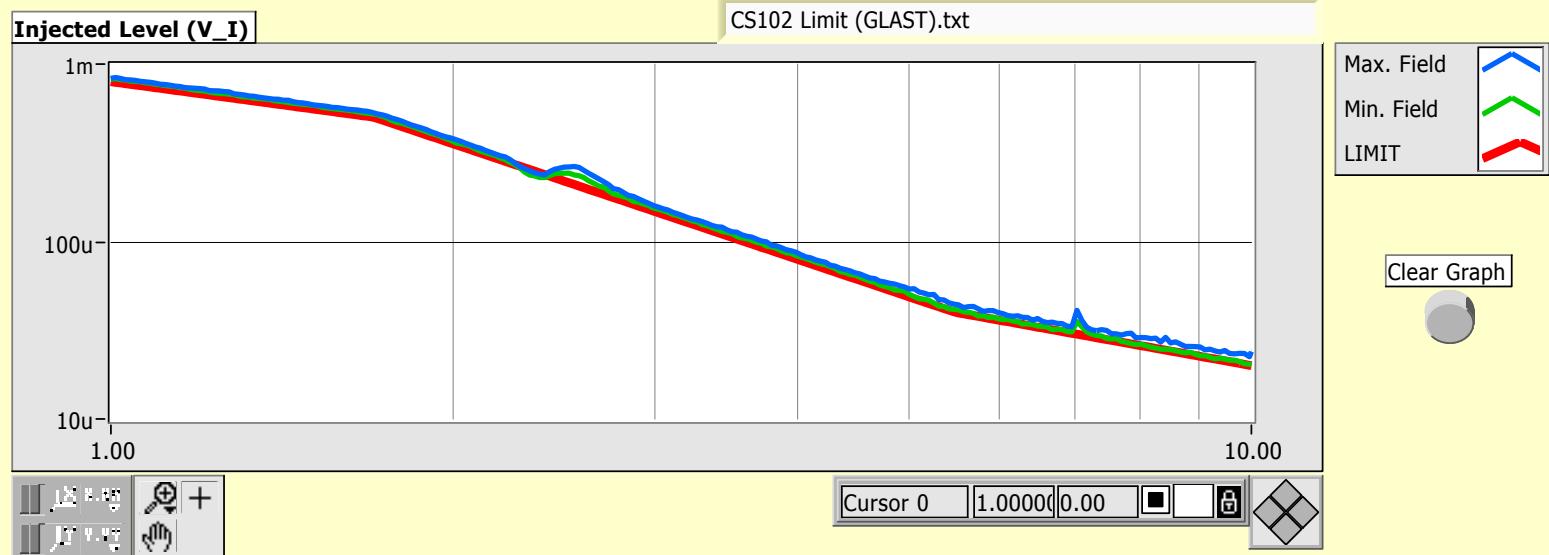
Control
Freq. Scan Paused
RF OFF

SWEEP RATES

MIL-STD-461D	MIL-STD-461E
30 Hz - 1 MHz 0.01	30 Hz - 1 MHz 0.05
1 MHz-30 MHz 0.005	1 MHz-30 MHz 0.01
30 MHz-1 GHz 0.0025	30 MHz-1 GHz 0.005
1 GHz - 8 GHz 0.001	1 GHz - 8 GHz 0.001
8 GHz -40 GHz 0.0005	8 GHz -40 GHz 0.0005

STOP

CP-SINGER 91550-1b sn996 (11_18_04).txt



Appendix G - Log Book Entries

Monday 12/13/04 CAL Tower Module FM 108

1000 Setting up EUT for Acceptance Testing
EUT

Name: CAL Tower Module
P/N: LAT-DS-04539
S/N: FM108

1432 CS01 Calibration 10kHz-100kHz Plot-001
Setup File Saved to Disk.

1440 CS01 Calibration 100kHz-150kHz Plot-002
Setup File Saved to Disk

1448 CS02 Calibration 150kHz-350kHz Plot-003
Setup File Saved to Disk

1500 CS02 Calibration 350kHz-1MHz Plot-004
Setup File Saved to Disk

1507 CS02 Calibration 1MHz-10MHz Plot-005
Setup File Saved to Disk

1524 Measure Bond Resistance

From CAL to GROUND Plane 0.93 mΩ

From CAL to Baseplate 0.50 mΩ

From Baseplate to GROUND Plane 0.52 mΩ

1547 CE102 Calibration Plot-006

11kHz 60 dBm4 Expected

2MHz 60 dBm4 "

9.9MHz 60 dBm4 "

All CAL Tones within ± 3 dB

SAT

1557 CE102 10kHz - 10MHz +28V DC Load Plot-007
Passed

1559 CE102 10kHz - 10MHz RETURN LOAD Plot-008
Passed

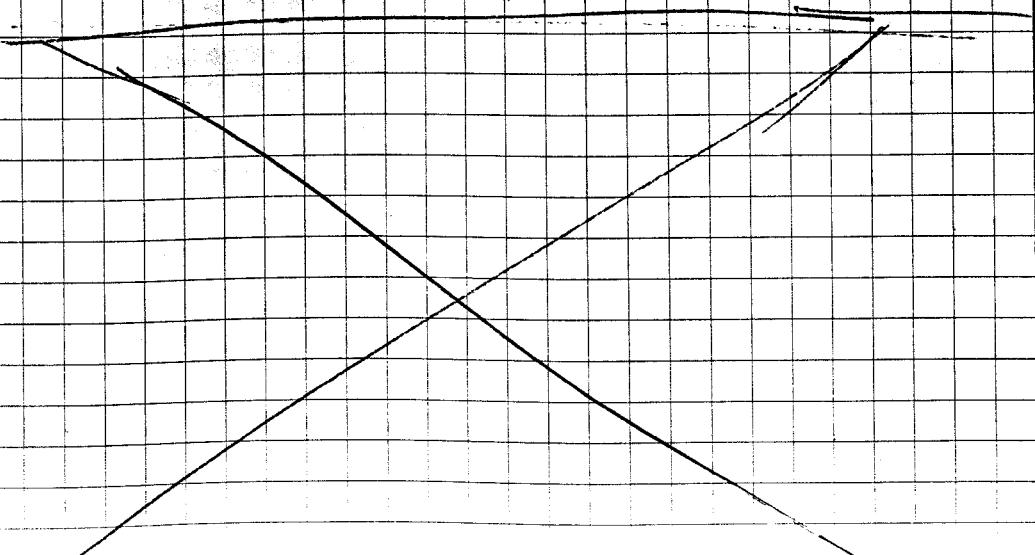
1600 Setting Up for CS01/02

Monday 12/13/04

CAL Tower Module FM 108

(cont)

- 1611 CS01 10KHz - 100KHz
Combined Test Mode Plot-009 Passed
- 1618 CS01 100KHz - 150KHz
Combined Test Mode Plot-010 Passed
- 1633 CS02 150KHz - 350KHz +28VDC Load
Combined Test Mode Plot-011 Passed
- 1637 CS02 350KHz - 1MHz +28VDC Load
Combined Test Mode Plot-012 Passed
- 1640 CS02 1MHz - 10MHz +28VDC Load
Combined Test Mode Plot-013 Passed
- 1706 CS02 150KHz - 350KHz RETURN Load
Combined Test Mode Plot-014 Passed
- 1709 CS02 350KHz - 1MHz RETURN Load
Combined Test Mode Plot-015 Passed
- 1712 CS02 1MHz - 10MHz RETURN Load
Combined Test Mode Plot-016 Passed
- 1728 Completed All Acceptance Tests on S/N FM 108
Breaking Down EMI Equipment
- 1730 Running Comprehensive Performance Tests (CPT)
12/14/04 Overnight to verify EUT still functions normally.
0800 Passed Functional



Tuesday 12/14/04 CAL Tower Module FM107

0830 Setting up EUT (FM107) for Acceptance Testing

EUT Name: CAL Tower Module
P/N: LAT-DS-09539
S/N: FM107

0840 Measuring Bond Resistance

CAL to Ground Plane	0.71 mΩ
CAL to Baseplate	0.46 mΩ
Baseplate to Ground Plane	0.28 mΩ

0850 Setting Up for CE102

0900 CE102 10kHz - 10MHz +28 VDC Load Plot-017
Combined Test Mode Passed

0902 CE102 10 kHz - 10 MHz RETURN Load Plot-018
Combined Test Mode Passed

0910 Setting Up for CS01/02

0921 CS01 10 kHz - 100 kHz Plot-019
Combined Test Mode Passed

0927 CS01 100 kHz - 150 kHz Plot-020
Combined Test Mode Passed

0941 CS02 150 kHz - 350 kHz +28 VDC Load Plot-021
Combined Test Mode Passed

0944 CS02 350 kHz - 1MHz +28 VDC Load Plot-022 Passed
Combined Test Mode

0947 CS02 1MHz - 10 MHz +28 VDC Load Plot-023
Combined Test Mode Passed

1020 CS02 150 kHz - 350 kHz RETURN Load Plot-024
Combined Test Mode Passed

1023 CS02 350 kHz - 1MHz RETURN Load Plot-025
Combined Test Mode Passed

1024 CS02 1MHz - 10 MHz RETURN Load Plot-026
Combined Test Mode Passed

1044 Completed All Acceptance Tests on S/N FM107
Not Running CPT

Tuesday 12/14/04

CAL Tower Module FM 106

1230 Setting up EUT (FM 106) for Acceptance Testing
 Name: CAL Tower Module
 P/N: LAT-DS-04539
 S/N: FM 106

1312 Measuring Bond Resistance

CAL to Ground Plane	0.71 mΩ
CAL to Baseplate	0.48 mΩ
Baseplate to Ground Plane	0.24 mΩ

1315 Setting up for CE102

1322 CE102 10KHz - 10 MHz +28 VDC load Plot-027
 Combined Test Mode Passed

1324 CE102 10KHz - 10 MHz RETURN load
 Combined Test Mode

Plot-028
Passed

1326 Setting up for CS01/02

1333 CS01 10KHz - 100 KHz Plot-029
 Combined Test Mode Passed

1339 CS01 100 KHz - 150 KHz Plot-030
 Combined Test Mode Passed

1348 CS02 150 KHz - 350 KHz +28 VDC load Plot-031
 Combined Test Mode Passed

1351 CS02 350 KHz - 1MHz +28 VDC load Plot-032
 Combined Test Mode Passed

1354 CS02 1MHz - 10MHz 728 V Plot-033
 Combined Test Mode Passed

1416 CS02 150 KHz - 350 KHz RETURN load Plot-034
 Combined Test Mode Passed

1419 CS02 350 KHz - 1MHz RETURN load Plot-035
 Combined Test Mode Passed

1422 CS02 1MHz - 10MHz RETURN load Plot-036
 Combined Test Mode Passed

1438 Completed All Acceptance Tests on SPA FM 106
 & Running CPT

Appendix H – Photographs